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# Defense Management Journal

January 1979



WP/PR



**WORK PLANNING/  
PERFORMANCE  
REVIEW:**

**A First Look  
at Treasury's  
Pilot Bonus  
Program**

# Defense Management Journal

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**A New Approach to Performance Evaluation and Recognition**

*Thomas J. Gelli*

Those of you who thought it was impossible to change the system: take note. The Department of the Treasury has launched a pilot program called Work Planning/Performance Review that could well mark the beginning of a new era in performance evaluation and recognition procedures used in the Civil Service. Under the new approach, which emphasizes collaboration be-

tween employee and supervisor and the delineation of job standards, employees could receive cash awards of up to \$5,000 for attaining or exceeding agreed-upon performance goals. This article outlines the new procedure, tells why a change was necessary, and interprets the new approach as a harbinger of performance evaluation reform in other Government agencies.

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**Designing to a Cost:  
An Update on Navy Initiatives**

*Joseph F. Grosson*

The concepts of designing to cost and designing to life-cycle cost are based upon the critical assumption that all costs, and in particular operating and support costs, must be identified and controlled as early as possible in the acquisition process. In this article, an experienced Navy manager identifies some areas where early cost considera-

tions are often neglected; presents a practical view of policy guidance provided by Office of Management and Budget circulars, Department of Defense directives, and the Armed Services Procurement Regulations; and offers an update on the latest Navy initiatives in controlling life-cycle cost.

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**The Priority Placement Program:  
The DoD Civilian's  
Employment Security**

*H. Adrian Osborne*

For more than 15 years, DoD has been operating a job-placement program for its employees who have been displaced as a result of reductions in the work force. This program, known as the Priority Placement Program, has a computerized network with a data bank listing displaced employees' skills and specialties and their rights to other Defense employment in order of priority.

In reviewing a random sample of placements during a period from January 1972 through February 1978, DoD found that the program had been very beneficial for program registrants and gaining supervisors. For example, even when employees changed their job series, most supervisors found their performance adequate or even superior.



**Are We Overlooking  
the Link between  
Water and Energy Resources?**

*Lt. Col. Ray D. Schwartz, USAF*

Problems involving the adequacy of energy resources are now generally acknowledged. Similarly, problems concerning water resources in the United States have been identified in the U.S. Water Resources Council's Second National Water Assessment. Indications are that these water-resources problems are not being recognized in the development of alterna-

tives for petroleum. Most alternative energy sources are water intensive and if fully developed will further adversely affect available water resources. The economics and conservation necessary to have both sufficient energy and water suggest that life-styles will change in the United States, with subsequent implications involving national security.

**Discount Rate Selection  
for Defense Decision Making**

*Robert Shishko*

The continuing discussion about the practice of discounting, the management technique whereby future benefits can be converted to current dollar values, has surfaced a medley of thoughts on the subject. While it is generally agreed that discounting is a useful and necessary practice, there is considerable question about the appropriateness of cer-

tain approaches and formulae under certain prevailing and projected economic conditions. Here the author takes a scholarly and highly theoretical look at some of these questions, addressing the impact of public investment on the private sector and the importance of global conditions as a variable in the discounting methodology.

**Aircraft Acquisition the  
Slabovian Way**

*Russell M. Genet*

In the cold and barren reaches of a distant, mythical continent, there endures the small and forlorn sovereignty of Upper Slabovia. For centuries, little has been known about this abidingly neutral nation except that it boasts an enviably cost-effective air force. Until now, the key to this success has been a

highly guarded secret. This article, written by an Upper Slabovian product-development analyst, lifts the lid off that secret and makes public an intelligence bonanza. Come along for the ride as our author spins a light-hearted yarn about aircraft acquisition in a far-away land.

**A Cost-Effective Enlistment Supply  
of Women for the Army**

*Major Gary Q. Coe*

With the suspension of the draft and the projected reduction in the 18- and 19-year-old manpower pool for the 1980s, the Army will have to satisfy personnel requirements by directing recruiting efforts at a less traditional source—namely women. Pursuant to DoD guidelines, the Army is hoping to increase its female enlisted strength to 80,000 by 1983. But will the results be

cost-effective? The issue, it seems, is not the predisposition of women to enlist, but rather the willingness of women to enlist in particular skill areas and to complete a full term of service. In this article, the author caveats the belief that graduated increases in female accessions offer an expedient stairway to a complete and stable fighting force.

**Inside back cover**

**News Summary**

**Calendar**



WP/PR

# A New Approach to Performance Evaluation and Recognition

*The practice of recognizing outstanding job performance with a monetary bonus is something that Government agencies, Government employees, and American taxpayers may soon be cashing in on.*

**F**or years, a new performance appraisal system for Federal employees has been much like the weather: everybody talks about it but nobody does anything about it. That is no longer true, as is evidenced by a recently launched pilot program in the Department of the Treasury which could well be a precursor to new performance appraisal and incentive bonus programs throughout the Civil Service.

The program, entitled Work Planning/Performance Review, is tailored after employee appraisal and incentive-award systems common to many private corporations. Rewarding efficiency with sizable cash awards marks a radical departure from traditional Civil Service practices.

Introduction of Work Planning/Performance Review to the Government is the brainchild of Secretary of the Treas-

ury W. Michael Blumenthal, who saw a pressing need to revamp the way Federal employees were rated and recognized for job performance. Impetus for the program came from a Department of the Treasury employee survey (see Figure 1, p. 4) and from a General Accounting Office survey, the latter of which disclosed that many supervisors do not supervise very well. In fact, more than a third of the Federal employees surveyed indicated that they received inadequate supervision and insufficient feedback on their job performance.

Spurred by these survey findings, Secretary Blumenthal established the Secretary's Management Committee to pinpoint ways of improving the efficiency of the department. The committee identified several important areas wherein improvements in management practices could lead to sub-

stantial improvements in employee performance. These areas included work planning, performance review, and the use of incentives to encourage exceptional performance.

More than 700 senior-level employees in the Treasury Department's Office of the Secretary are participating in the pilot program. Nearly 10 percent of them will earn cash awards totaling \$150,000. Additionally, Secretary Blumenthal has made it clear that performance will now be more closely linked to all forms of recognition, including traditional awards and citations, career development opportunities, attractive assignments, and merit promotions. Last year, Treasury gave out \$27,000 in incentive awards to employees in a pilot group. It should be noted that although political appointees will participate in WP/PR ac-



## Figure 1. Selected Results of Treasury's Employee Survey

*Shortly before implementing the pilot bonus program, the Office of the Secretary of the Treasury surveyed its employees to obtain their views on the existing performance evaluation and recognition system. Hereunder is a selection of those results.*

<b>Procedures</b>	Almost all viewed the existing procedures as deficient and inappropriate
<b>Awards</b>	More than half perceived awards as being unrelated to performance
<b>Management</b>	More than half viewed top management as being unable or unwilling to improve existing procedures
<b>Standards</b>	More than a third did not know that standards were used to measure their performance
<b>Objectives</b>	Less than a third planned work objectives with their supervisors
<b>Ratings</b>	A fourth had never had their performance rated

tivities, they are not eligible to receive cash bonuses.

The WP/PR procedure is quite simple (see Figure 2). It begins with a lengthy discussion between the employee and the supervisor. They collaborate in writing down exactly what the tasks and responsibilities of the position are and in formulating an individual work plan which delineates the goals to be reached in the forthcoming rating period, which is usually six months. They also draft clear, well-defined job standards against which employee performance can be specifically measured. Job standards are expected to be an appropriate mix of qualitative and quantitative criteria.

If, by the end of the rating period, the employee has efficiently met or exceeded the agreed-upon goals and performance levels, his supervisor will rate him outstanding and recommend that a cash bonus be issued. Recommendations for a cash bonus are re-

viewed and screened at each successive echelon of the chain of command. The final decision is made by a review committee chaired by the Secretary of the Treasury. The awards will be presented in the fall, much as pre-Christmas bonuses are given out in some private firms.

While the ideal employee-supervisor relationship is marked by frequent and open communication regarding performance throughout the year, seldom is this the way it really is. Usually these exchanges are perfunctory and incomplete; in some relationships, they do not take place at all. But the WP/PR approach to performance appraisal and recognition emphasizes and promotes thorough, thoughtful, and regularly scheduled communication between employee and supervisor. Feedback on quality of performance and on progress being made toward goals is critical. It truly behooves the employee to encourage the supervisor to provide

guidance and to evaluate performance throughout the rating period. Feedback from subordinates also is encouraged, and should address specific ways in which the supervisor can help the employee improve.

## Areas of Concern

Skeptics of the WP/PR fear that supervisors will be overly generous in their ratings and in their recommendations for cash awards. However, Secretary Blumenthal has hastened to point out that because performance ratings are relative, only a limited number can actually be outstanding. Concern has also been expressed about the possibility of a supervisor setting goals so unrealistic that the employee has only a remote likelihood of reaching them. Yet industry's experience with the approach indicates the contrary. In instances where there has been some disagreement in setting fair and appropriate goals, it generally has been the employee who sought the more difficult and challenging goals. The reasoning is simple: the more difficult the goal, the more competitive the employee becomes for a cash award.

Although there is no inherent safeguard against employee-supervisor collusion in setting easily attainable goals, one must keep in mind that all recommendations for awards are carefully reviewed at succeeding levels of management. Moreover, supervisors will be executing performance reviews under the watchful eyes of assistant secretaries, who will alert the Secretary of any suspected abuse or impropriety.

Although much thought and effort go into formulating the basic work plan, it is by no means a static document. In fact, as situations or work conditions change, so should the work plan. For example, goals and job standards can be expected to change if the employee's responsibilities change. Work statements for assignments that are cancelled before significant work can be done by the employee may be expunged from the work plan. And if for some reason there is a change of supervisors during a rating period, renegotiations may be in order.

In addition to providing some very

substantial work incentives, WP/PR will help supervisors identify subordinates who are not sufficiently contributing to the work effort. In uncouched terms, WP/PR takes aim at deadwood which has become comfortably entrenched in the bureaucracy.

### Three New Forms

As with the introduction of most new procedures, skeptics and traditionalists express displeasure over the prospect of additional and unfamiliar paperwork. Such predispositions to

WP/PR are unfounded. The approach requires no more than what a supervisor should reasonably be expected to do. Granted, in many cases work planning will be a new task, but certainly its potential dividends in terms of productivity far exceed the investment of effort. Furthermore, employee performance should be appraised periodically anyway; this approach merely tacks on the possibility of a cash bonus for the most deserving employees.

The procedure for the pilot program calls for the use of the following three basic documents (also see Figure 3, p. 6).

**Work Plan.** At the beginning of the six-month rating period, the employee and supervisor collaborate in completing this five-part form which, once completed, describes each major work assignment in terms of required job tasks, schedules, and objectives. It also delineates the job standards against which performance will be measured.

**Evaluation of Job-Related Practices.** Completed at the end of the six-month rating period, this two-part form requires the supervisor and employee to provide inputs independently. The

**Figure 2. The Step-by-Step Procedures of the Work Planning/Performance Review**

<u>Who</u>	<u>What</u>	<u>When</u>
1 Supervisor	Establishes goals for organizational unit	Beginning of staff year
2 Staff Member	Describes tasks to be undertaken (section 1 of the Work Plan) Develops performance standards for each task (section 2 of the Work Plan)	Beginning of the performance period or when a major new assignment is made
3 Supervisor	Reviews and approves the tasks and performance standards described by the staff member on the Work Plan	Directly after the staff member has completed sections 1 and 2 of the Work Plan
4 Staff Member	Appraises own performance (section 3 of the Work Plan)	Periodically or at the end of the semi-annual rating periods (Jan 15 and Jul 15)
5 Supervisor	Appraises the staff member's performance (section 4 of the Work Plan)	Periodically or at the end of the semi-annual rating periods
6 Supervisor	Rates staff member's performance (section 5 of the Work Plan)	Upon completion of sections 3 and 4 of the Work Plan
7 Supervisor	Rates staff member's job-related practices (section 1 of Evaluation of Job-Related Practices)	End of semiannual rating periods
8 Supervisor	Summarizes the employee's performance in the context of Work Plan objectives (sections 1 and 3 of Performance Appraisal and Overall Achievement Rating)	End of semiannual rating periods
9 Staff Member	Gives feedback on rating to supervisor (section 2 of the Performance Appraisal and Overall Achievement Rating)	End of semiannual rating periods
10 Reviewing Official (Supervisor's Supervisor)	Reviews WP/PR documents Discusses rating with subordinate supervisors if in disagreement with rating	Upon receipt of WP/PR documents from supervisor



supervisor uses the first part of the form to rate the employee on attributes not directly related to specific work assignments. These include characteristics such as initiative, consistency, ability to work independently, and ability to develop good work relationships. The supervisor makes comments and specific suggestions for improvement. If the subordinate is in a supervisory position, the rater must assess the supervisor's skills in assigning work, recognizing good work, and dealing professionally and fairly with subordinates.

**Performance Appraisal and Overall Achievement Rating.** At the end of the six-month period, the supervisor uses this form to summarize the subordinate's overall performance, making specific reference to the provisions of the work plan. In essence, this form

serves as the basis for determining whether performance merits recognition or needs improvement.

It should be noted that a poor rating on a major assignment does not constitute a warning of adverse action. It is assumed that an employee will have several assignments of varying importance and that all assignments will not be completed with equal proficiency.

### **Looking Ahead**

The pilot program's first rating period ends June 30, 1979. By then, the program should have begun to bear fruit for the Treasury Department and for those employees who have demonstrated that they truly merit a more tangible form of recognition. It is entirely possible that the seeds of this fruit will eventually germinate throughout the Civil Service system. **DMJ**

**Figure 3. The Basic Documents of Work Planning/Performance Review**

<b>Work Plan</b>	Assignments, tasks, and goals Performance standards Employee self-evaluation of past performance Supervisory evaluation of employee's past performance
<b>Evaluation of Job-Related Practices</b>	Supervisor's assessment of employee: <ul style="list-style-type: none"> <li>● Initiative</li> <li>● Work relationships</li> <li>● Use of time</li> <li>● Consistency of effort</li> <li>● Acceptance of responsibility</li> </ul> Assessment of supervisory practices: <ul style="list-style-type: none"> <li>● Assigns work clearly</li> <li>● Makes priorities known</li> <li>● Ensures that performance standards are met</li> <li>● Provides adequate guidance</li> <li>● Contributes to work effort through managerial initiatives</li> </ul>
<b>Performance Appraisal and Overall Achievement Rating</b>	Supervisor's narrative evaluation of employee's performance Employee's comments and suggestions about supervision Supervisor's computation of employee performance on specific assignments Recommendation for award



# Designing to a Cost:

## An Update on Navy Initiatives

*By Joseph F. Grosson*

*A Navy manager offers his seasoned views on the implications of designing to cost and designing to life-cycle cost.*

The theoretical basis for the philosophies of design to cost and design to life-cycle cost is that long-term operating and support costs can be properly controlled only by identifying them as early as possible in the acquisition cycle. In the Navy, the earliest that such cost data can be articulated is during preparation of the development proposal, or for major programs, in the Mission Element Needs Statement.

Through the development proposal, the Naval Material Command initially recommends alternatives for meeting the operational requirement defined by the Chief of Naval Operations. Although each of these alternatives is costed out to some degree, such data may not be absolutely accurate and are accordingly considered in the broadest context. However, even such rough estimates are useful in determining which alternatives apparently have the lowest operation and support costs, and thus serve as an important tool in making acquisition decisions.

As a program progresses, a decision coordinating paper is prepared or updated at each decision point or milestone. This paper serves as the primary document for program review and for the formulation of recommendations to the Secretary of Defense and to the Secretary of the Navy on each new program phase. At each successive milestone, program costs and schedule, performance, and readiness factors become more accurately defined; this allows managers to make the trade-offs among them that are necessary if the desired product is to be acquired at the lowest cost. Program decisions are subsequently incorporated into the evolving decision coordinating paper, which ultimately serves as the agreement obligating the Navy to conduct a program.

Designing for the life cycle of a program is not new; this concept has been applied in the Navy to such pro-

grams as the Tomahawk, the Electronics Warfare Suite, the F-18 aircraft, and the High-Speed Anti-Radiation Missile. Considerable attention has also been paid to applying life-cycle costing in the Polaris, Poseidon, and Trident missile programs.

A number of aspects are fundamental to developing the life-cycle-cost equation for a particular program. First, a meaningful and very complete work-analysis structure must be developed for every facet of a program. This includes development of the initial product, planning for testing, and all of the logistics of the operational and support phase, as well as such often-neglected factors as



personnel training and program-management costs. The Navy must also resist the temptation to rely principally on contractor estimates or incomplete historical data for what appears to be a similar program, but frequently is not. The Navy cannot be certain that all of the same elements and aspects are covered to the same extent or degree from one program to another, or in fact that they should be covered to the same extent. Policies and conditions change over time. Thus, caution is warranted in using formulas or equations to generate cost elements based on historical data.

## Pitfalls

In many programs, there are cost elements which have been partially or totally omitted. Examples include:

- *The failure to consider total life-cycle support elements, particularly in computer software.* Related to this problem is the failure to consider the ramifications of transition from contractor to military support. For this transition to take place, adequate resources must be invested to ensure that military maintenance personnel will have the necessary documentation and training to accept this responsibility. Since the transition can take place several years after initial deployment, a program manager can easily omit software costs from logistics cost estimates, or even from the total life-cycle-cost model.

- *The failure to include logistics elements in the development phase.* Provisioning documentation and training-related elements such as training aids, curricula, and lesson plans are some often-neglected logistics cost elements.

- *The failure to identify manning configurations and costs.* The project manager must determine the numbers and types of personnel required to operate and maintain the system in the fleet. He must determine if properly rated personnel in the proper numbers will be available on these ships throughout the life cycle of the weapons system. This means that manpower and personnel studies must be conducted and considered early in the design phase in order to make trade-offs regarding maintenance and supply concepts.

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“The bottom line is that design to life-cycle cost is here to stay, and the Navy is going to do whatever is necessary to ensure that its implementation is successful.”

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- *The failure to adequately identify and price military-construction requirements.* There are military-construction funds for land-based test sites which managers must consider in both the development and deployment phases of a program.

- *The failure to consider the impact of inflation.* During the last six to eight years, the Navy has learned that it must pay proper attention to rising personnel costs and price increases for key materials. For example, several years ago, the price of certain electronic components was escalating far faster than the Navy anticipated. Obviously, the Navy must be able to recognize and properly anticipate such escalation.

- *The failure to fully state the project manager's actual needs for management services.* To properly manage a very complex, multimillion-dollar program, a project manager will typically need to augment his staff. This should be recognized and budgeted for during the acquisition phase of a program.

Incomplete budgeting, which is indicative of inaccurate perceptions of acquisition requirements, invariably leads to program failure. When this happens, sufficient funds may not be available to properly pursue the required effort or funds may be available for the wrong fiscal year. Schedules slip when funds are not available on time, and this ultimately increases total program costs. On the other hand, funding some efforts too early can also increase costs, since funds are expended for a longer period of time.

Good budget direction is needed to overcome potential problems. For this, a carefully prepared program definition is essential. It may include concept documents, specifications, a well-planned budget procedure, an appreciation of integrated-logistics-support policy, and a rational method for determining, validating, and updating budget requirements.

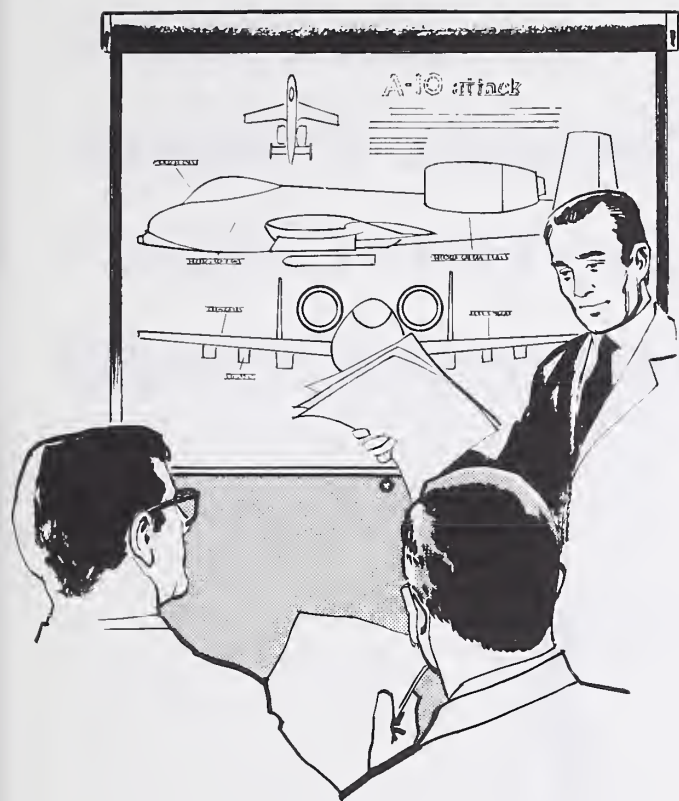
## Policy Guidance

In addition to these practical day-to-day considerations, project managers must consider the guidance issued in Federal regulations and departmental directives. Defense managers must follow life-cycle-costing policy stated in Office of Management and Budget circulars, Defense Department directives, and the Armed Services Procurement Regulations.

The Armed Services Procurement Regulations state that cost is a contract parameter equal in importance to performance requirements throughout all phases of system development and deployment, and that in order to be effective, design-to-cost strategy should be planned at the inception of a program. Office of Management and Budget Circular A-109 likewise states that managers must ensure appropriate trade-offs among investment costs, ownership costs, and schedule and performance characteristics. DoD Directive 5000.1 cautions, however, that performance costs and schedule estimates should not be considered as firm figures prior to milestone 2, since systems are not adequately defined and the values for the system parameters remain uncertain during the early phases of the acquisition process.

This may certainly be the case; but in the author's opinion, if one has performed a sufficiently detailed work analysis and has applied costing criteria uniformly





to all alternatives, then one has obtained the wherewithal to run sensitivity analyses of each alternative and to select the best alternative from a life-cycle-cost standpoint. DoD Directive 5000.2 emphasizes this point.

### ***Navy Initiatives***

The Naval Material Command has formulated its own techniques and procedures for implementing these life-cycle-cost policies. The command spends over \$17 billion a year to acquire systems for the fleet and to support them. To assist in these endeavors, the Chief of Naval Material has one principal deputy for logistics, another for acquisition, and a director of resource management. These flag-level staff members comprise the new Acquisition Review Board, chaired by the Deputy Chief of Naval Material for Acquisition, who establishes and oversees policy for design to cost and design to life-cycle cost.

The board is the highest-level forum for program review within the Naval Material Command prior to review and approval by the Chief of Naval Operations, the Office of the Secretary of the Navy, and the Office of the Secretary of Defense. It provides an opportunity for command-level management to become involved in the life-cycle design of virtually every major program before it goes forward for approval or review by higher authority. Further, the Acquisition Review Board issues a memorandum summarizing the results of its review and delineating specific actions required.

Still another initiative, based upon a rather lengthy study of policy alternatives for life-cycle design, involved the issuance of a policy document by the Chief of Naval Material. It stated that system commanders should assure that project-management personnel fully consider investment and ownership costs as well as schedule, performance, and readiness trade-offs at each step in the acquisition cycle. Further, it directed system commanders to ensure that data-collection and data-handling procedures promote understanding of life-cycle costs and schedule, performance, and readiness interrelationships; it also told them to indicate whether plans are being achieved.

To establish a basis for assessing the returns, system commanders were instructed to provide cost-benefit analyses of design to life-cycle cost. The Chief of Naval Material then directed program reviewers to assess how successful the efforts were and to examine whether organizations were supporting these methods. Finally, system commanders were required to identify a central point of contact for their commands who would implement the design to life-cycle-cost policy.

### ***What Is Ahead?***

Today the Chief of Naval Material is creating a new organizational element to advise him on cost analysis, estimating, and related functions. This new organization will consist of a small staff headed by a civilian senior executive under the Deputy for Resource Management. In addition to having many functions associated with cost analysis and estimating, it will advise the Acquisition Review Board on the quality and adequacy of program cost estimates. Navy systems commands are examining their internal organizations, particularly in the areas of acquisition, logistics, and comptrollership. A detailed review and analysis of the organizational structure is now under way, with some attention being paid to the proper placement of the cost-analysis and cost-estimating functions and to the policy-making and execution functions of designing to life-cycle cost in all Naval Material Command programs.

The bottom line is that design to life-cycle cost is here to stay, and the Navy is going to do whatever is necessary to ensure that its implementation is successful. Very simply, the idea makes sense. **DMJ**

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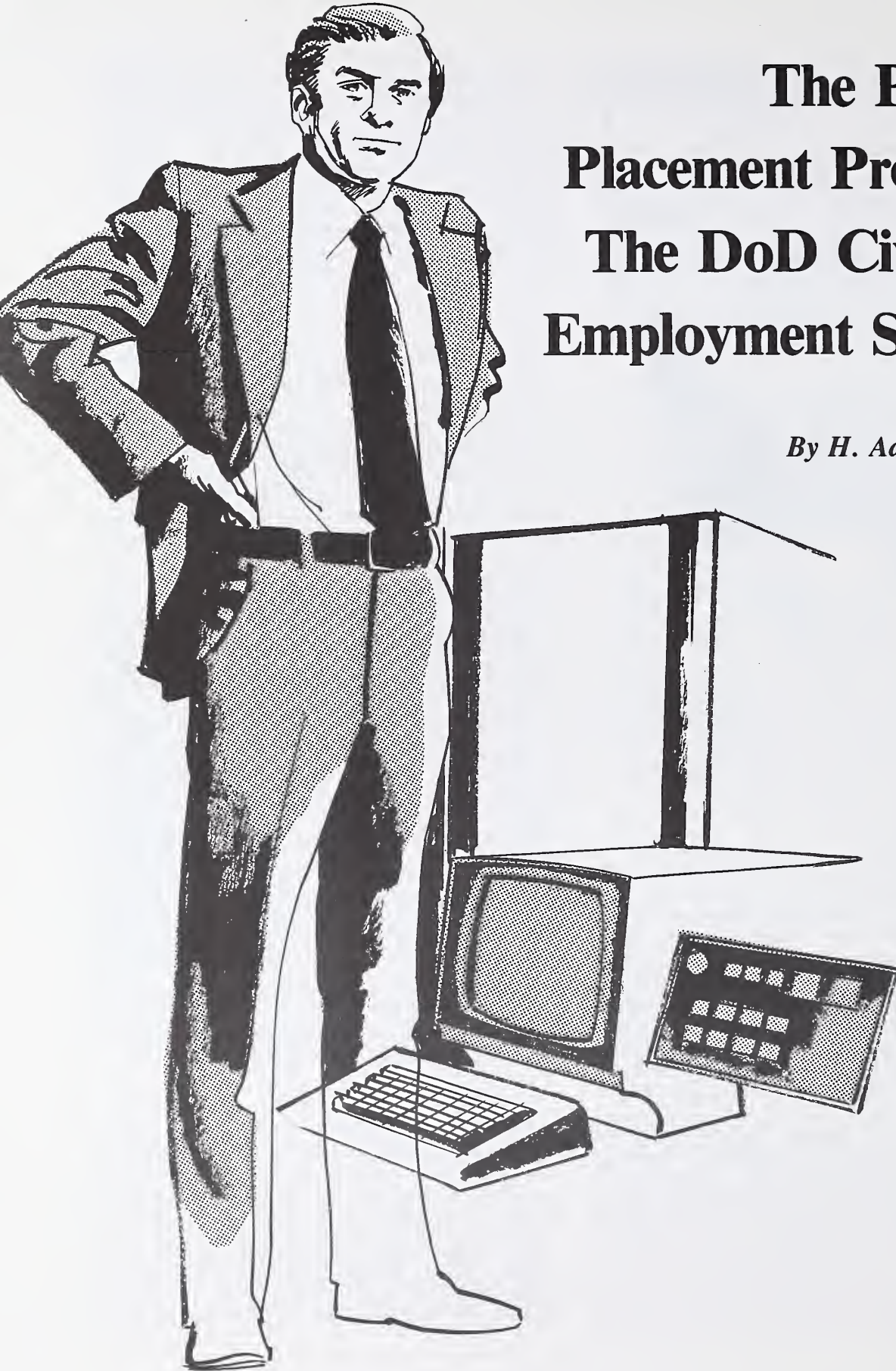
*JOSEPH F. GROSSON, as Assistant Deputy Chief of Naval Material for Acquisition at the Naval Material Command, formulates acquisition policy and oversees execution of the acquisition process within the Naval Material Command. He holds a bachelor's degree in marine engineering from the State University of New York and a master's degree in mechanical engineering from the Catholic University, Washington, DC. He is also a registered professional engineer and a licensed merchant-marine officer.*

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# **The Priority Placement Program: The DoD Civilian's Employment Security**

*By H. Adrian Osborne*



*Since 1965, the Priority Placement Program has filled more than 70,000 vacancies with Defense employees adversely affected by reductions in force.*

On December 12, 1963, then Secretary of Defense Robert S. McNamara held a press conference to announce the closing of a number of Defense activities and installations. This particular announcement differed from all the previous in one respect: McNamara stated that every DoD civilian employee displaced as a result of the reductions would be guaranteed at least one offer of continued employment in another position within DoD.

To meet this job-offer guarantee, the Defense Logistics Agency was directed to develop an automated outplacement system for separated and soon-to-be-separated civilian employees. The Defense Electronics Supply Center, Dayton, Ohio, was selected as the location for the automated system.

By March 1965, the DoD Priority Placement Program had been developed, tested, and implemented. The DoD Centralized Referral Activity, a function of the Deputy Assistant Secretary of Defense for Civilian Personnel Policy, was established to administer the program.

Before introduction of the Priority Placement Program, scenarios like the following were all too common: An Army activity in New Jersey reluctantly separates 20 highly qualified electronics engineers because of reorganization. At the same time, a Navy activity in California, unaware of the New Jersey reduction-in-force, recruits 20 electronics engineers off the street.

That should no longer happen. The Priority Placement Program is an automated system that matches appropriately skilled, surplus DoD employees with DoD position vacancies. Each of the 789 Defense activities that employs 50 or more civilians is tied into a computerized network. When there is a vacancy matching the skill held by an employee appearing on a computerized stopper and priority list, it is mandatory that the employee be offered the position.

Based on their employment status, DoD employees in need of placement assistance are ranked on a priority scale of one (the highest) through five. Offers of employment are tendered in order of priority. A priority one is assigned to an employee who is faced with a reduction-in-force separation, a reduction-in-force demotion of six or more general-schedule grades, or with a furlough of more than six months. A priority two is assigned to an employee who is being demoted four or five grades or is declining geographical transfer. A priority four designation is given to one who is being demoted three or fewer general-schedule grades. Priorities three and five apply

to nondisplaced overseas employees having no return rights at all or having return rights to a lower-graded position.

DoD employees may register in as many as five skill areas in which they have been determined by their civilian personnel office to be well qualified; they may not, however, register for placement in higher-graded positions. To minimize relocation costs, they may also elect referral to activities within a proximate geographic area determined by their civilian personnel officer as most likely to produce a job offer.

Since its inception in 1965, the Priority Placement Program has placed more than 70,000 DoD employees.

Although the job-guarantee aspect of the program was dropped in the fall of 1969, a variety of other assistance is rendered to a priority-one registrant. Figure 1 represents a tracking of 35,367 priority-one employees who were registered and released from the program during the period of January 1972 through February 1978. Figure 1 indicates that only 13.5 percent of the registrants were released from the program without receiving assistance. Follow-up telephone contact with these registrants indicated almost without exception that each severely restricted the geographic areas, types of jobs, and grade

**Figure 1. DoD's Track Record in Placing 35,367 Priority Registrants, Jan. 1972 - Feb. 1978**

Action	Number of Priority-One Registrants	Percent of All Registrants
Placed at another DoD activity	19,107	54.0
Placed in another Federal agency	952	2.7
Placed in industry by DoD	77	0.2
Force reduction canceled after registration	3,559	10.1
Retired	523	1.5
Resigned; not interested in DoD placement	282	0.8
Program eligibility expired	4,788	13.5
Declined a valid offer of Federal employment	3,384	9.6
Removed at request of Civilian Personnel Office	1,850	5.2
Removed at registrant's request	798	0.3
Removed for cause	6	0.0
Deceased	41	0.1



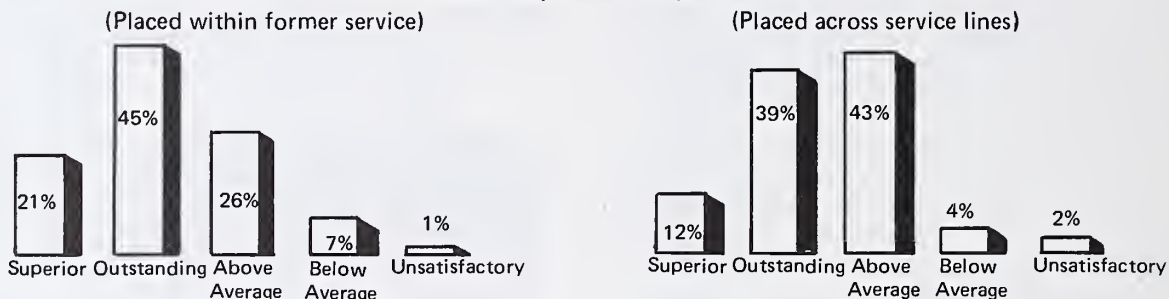
## Measuring the Effectiveness of the DoD Priority Placement Program

*Results of a random-sample survey, in which 381 placed employees and their new supervisors compared the performance of placed employees with that of their new peers, indicate the program is a most worthwhile endeavor.*

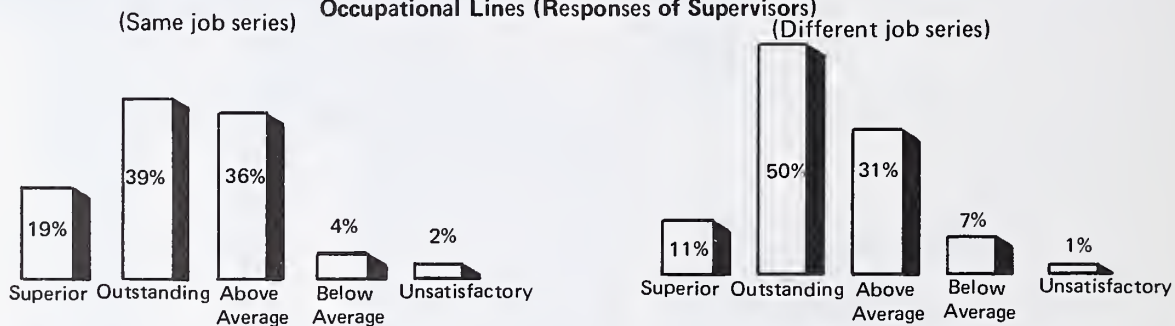
### Overall Performance



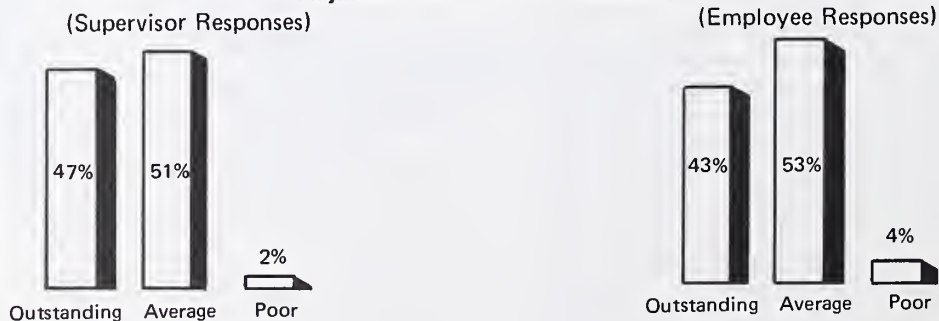
### Service Lines (Responses of Supervisors)



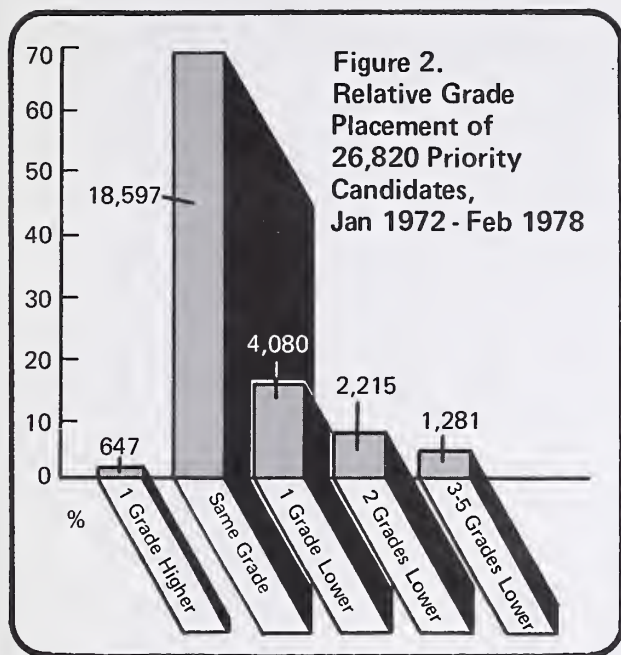
### Occupational Lines (Responses of Supervisors)



### Adjustment to Job and Community







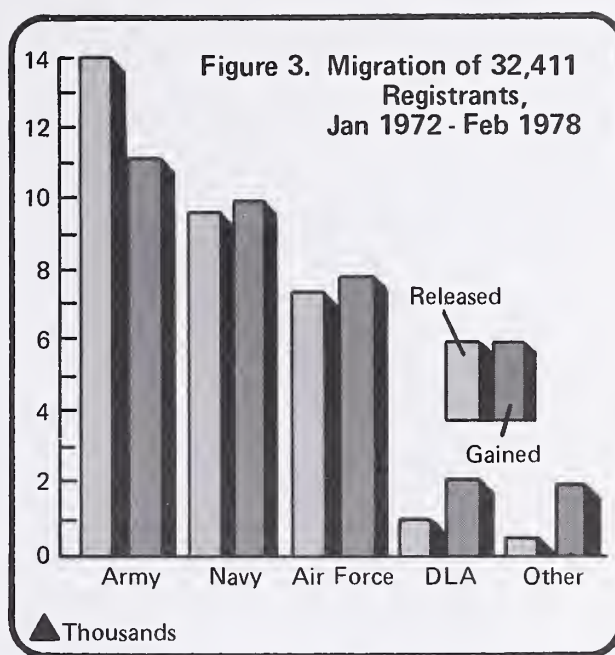
levels he or she would accept. Most belonged to families with one or more wage earners still gainfully employed in the local labor market, which caused many to narrow their geographic availability.

A random sampling of 300 priority-one registrants placed in other Federal positions indicated that 59.7 percent were placed prior to their separation from DoD. On the average, placement for members of this group occurred 33 days before the scheduled date of separation; for those registrants placed after separation, average time between separation and placement was 147 days.

Although the program boasts a large number of offers and placements, occasionally a displaced employee is forced to take a cut in grade. But an analysis of 26,820 program placements between January 1972 and February 1978 revealed a loss of grade in only about 30 percent of the cases (see Figure 2). Fewer than 5 percent of the placements were in positions two or more grades below the registrant's former grade. Although the great variety of wage-grade locality pay schedules makes it difficult to conduct a similar study of wage-grade employees, it seems reasonable that the same trends in placement would be exhibited.

In the 50 states, 74 percent of all DoD activities are located in a labor-market area that contains at least one other Defense activity. As a result, 58 percent of all placements have been made within the registrant's commuting area. Nearly 65 percent of all declinations were to offers from outside the commuting area.

Some indication of the degree to which each military component has been involved in the program is shown in Figure 3. During the cited time period, the Navy and Air Force actually gained more program registrants than they released.



On any given day, anywhere from 2,000 to 9,000 DoD employees are in the Priority Placement Program inventory. In 1975, the Office of the Secretary of Defense set a goal of making placement offers to at least 10 percent of the PPP inventory each month. Figure 4 (p. 14) reflects the success in meeting that objective in the last three years.

To obtain some indication of the quality of the placements, the DoD Centralized Referral Activity surveyed 381 placed registrants and their new supervisors. Neither group was shown the other's responses, yet there was a high degree of correlation between the two sets of replies.

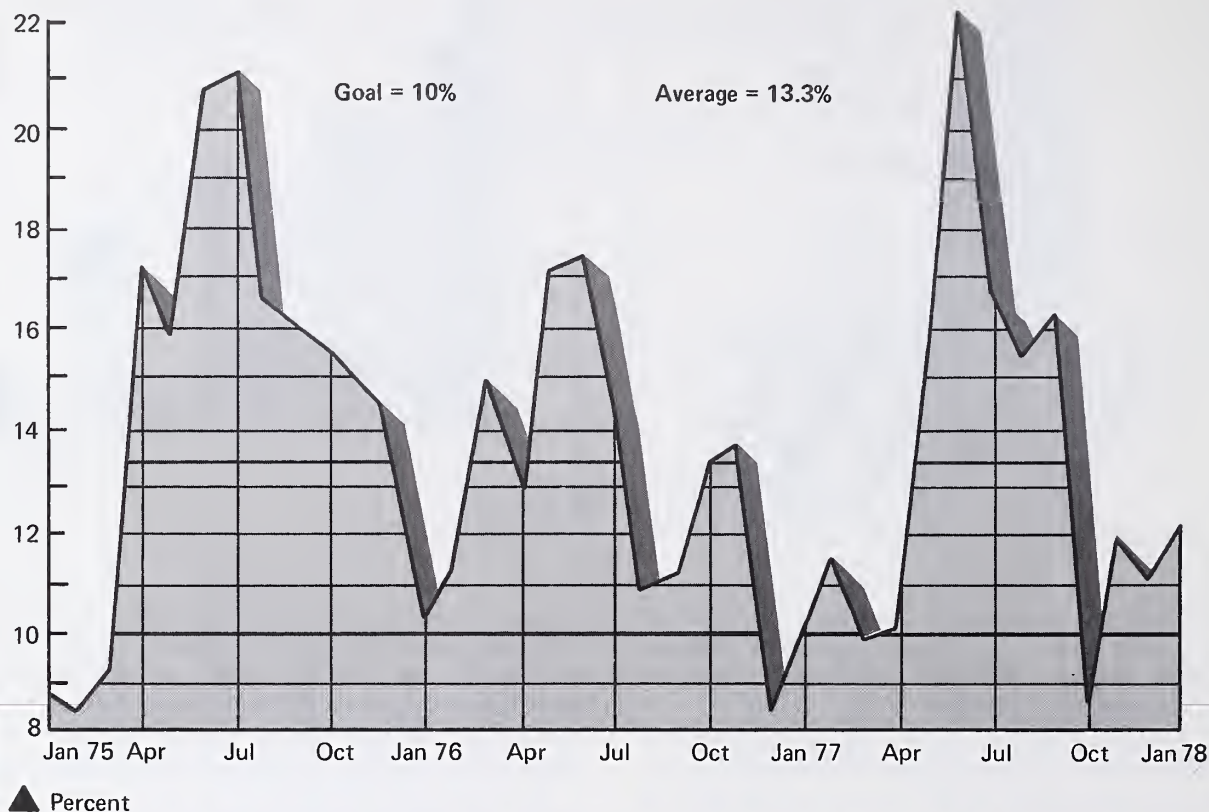
For example, when supervisors were asked to compare the employees placed through PPP with their other employees in the same line of work and at the same grade, only seven percent responded that their PPP employees were below average. Moreover, when PPP employees were asked to compare their performance and effectiveness to that of other employees of the same grade and line of work at their new activity, more than half responded that they felt they were above average or superior.

Responses to a question about the employee's adjustment to his new position and geographic area clearly revealed an overwhelming consensus among employees and supervisors that placed employees had had little or no trouble adjusting.

Does the quality of placements suffer when an employee is transferred from one Defense component to another? Supervisors were asked to compare these 381 employees' performance with that of the rest of their employees. Their responses indicated that employees who remained in the same component were doing better than those who crossed service lines; however, the difference was slight.

Because employees are sometimes compelled to change

Figure 4. Monthly Percentage of Program Registrants Receiving Placement Offers



job series, one might expect the quality of such placements to be lower than where the registrants remained in the same series. Thus, placement into substantially different occupational series was addressed in the survey.

As could be expected, employees who remained in the same job series did better than those who changed series; however, as with component crossover, the difference was not especially significant. Of those placed employees remaining within a job series, 95 percent met or exceeded the performance-level norm; of those changing job series, 92 percent met the norm.

Like other managers, DoD supervisors seldom receive a mandated placement as enthusiastically as one made from a referral roster, whereby the gaining supervisor can exercise a variety of options. Nonetheless, 93 percent of the supervisors surveyed indicated that placed employees were equal to or better qualified than other employees of the same grade and line of work at the gaining activity.

The number of surplus employees placed and the quality of those placements are substantive evidence of the effectiveness of the Priority Placement Program. A General Accounting Office study conducted in 1971 assessed the total administrative and computer cost per placement at \$23.73. While inflation may have added to that cost,

reprogramming and improved methods of operation have helped to hold down the cost per placement. Indeed, the program represents an inexpensive and effective means for ensuring continued employment for DoD civilian personnel.

On April 26, 1978, Secretary of Defense Harold Brown announced that he had approved recommendations to realign, reduce, or close 85 military installations and activities in the United States. Such actions could result in the elimination of 8,600 civilian positions. Approximately 10,000 more civilian employees would be displaced by transfer of function. It appears that the demands on the Priority Placement Program during the next two years could be quite heavy. Thus, it would be wise for DoD managers at all levels to familiarize themselves with the program, its procedures, and its usefulness.

**DMJ**

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# Are We Overlooking the Link between Water and Energy Resources?



*In the face of a petroleum shortage, the development of alternative energy sources may threaten our increasingly scarce water supply, and thus our economic order and national security.*

*By Lt. Col. Ray D. Schwartz, USAF*



**T**he drain on energy resources is commanding increased public attention. Although the need for action seems obvious, Congress has yet to fully address the energy problem. The private sector, however, seems to have embarked on energy-conservation programs of varying effectiveness. Utilities and industry are rapidly re-converting to the use of coal. Automotive manufacturers are designing greater fuel economy into automobiles, and housing insulation sales are up.

Because the largest single factor in the energy-resources equation is petroleum, the United States has spent most of its time trying to address the vexing issues of a developing petroleum shortage. As a result, not enough attention has been directed to the intensifying demands on available water resources. The Second National Water Assessment, which provided the impetus for a study recently conducted at the National Defense University, indicates that much of the United States has or will have problems with the quality and quantity of water resources.<sup>1</sup>

Unfortunately, the growing relationship between water availability and energy resources was neither emphasized by the National Water Assessment nor addressed by the executive branch when it announced the national water policy several months ago. Consequently, problems involving water resources are being handled separately from those involving energy resources. One group of problem solvers is focusing on energy and another on water. Apparently lacking is an appreciation of the impact that the proposed alternative energy resources will have on water resources.

There have been a number of positive steps taken in the total energy picture but, as with the proposed solutions to water-resources problems, they are uncoordinated. Moreover, there is no way to foretell public reaction when the de-

mand for alternatives to petroleum aggravates water-resources availability problems.

Quantifying the dimensions of this connection is not always possible. First, there is a lack of awareness of the energy-water connection, and little effort has been expended to measure the quantities of water involved. Second, much of the technology for the alternative energy sources is in an early stage of development and exact water requirements cannot be firmly stated.

The largest energy resource which depends on water for production is fossil fuel, which includes coal and oil. The permanent and increasing gap projected to occur between oil production and demand in the mid-1980s seems no longer to be in dispute.<sup>2</sup> Yet, there appears to be little public concern about oil shortages, and petroleum interest groups continue to provide assurances that the energy problem is the cry of alarmists.

Still, the activities of the oil companies support the prediction of future oil shortages. The Atlantic Richfield refining company is in the coal-mining business in Wyoming and is acquiring Anaconda; Mobil obtains 20 percent of its income from activities other than oil; Sun Oil is diversifying; and Exxon advertisements describe their efforts in uranium exploration. Even more to the point, a February 1978 issue of *Fortune* magazine contains comments by officials of major oil companies about a decline in oil production and a need to place company money elsewhere.

Oil companies have not stopped efforts to push petroleum production, but they are investing in alternative hydrocarbon sources. A corollary to the total energy problem is that technology for these alternatives is still

being developed and cost estimates are continuing to rise. In 1977, a major oil company estimated the selling prices of oil derived from various domestic sources as \$14 to \$20 per barrel of oil from tar sands, \$25 from oil shale, and \$30 to \$40 from coal liquification. In comparison, oil could be obtained from



This pilot liquifaction plant on the outskirts of Chicago produces a synthetic natural gas from coal, but not without exacting a cost in increased water usage.

<sup>1</sup>U.S., *Water Resources Council, The Nation's Water Resources: The Second National Assessment Summary Report*, March 1978. See also Lt. Col. Ray D. Schwartz, "Current and Projected Water Resources Problems and Their Impact on DoD Installations," a technical report to be published in February 1979 by the National Defense University, Washington, D.C.

<sup>2</sup>President Gerald R. Ford, "The Energy Problem," address to the nation, April 1977.

*Preceding page:* An oil-drilling platform in Alaska's Cook Inlet. Declines in oil production are compelling major oil companies to investigate other means of meeting America's energy needs. (All photos courtesy of the American Petroleum Institute.)

the Middle East in 1977 for \$13 per barrel.

When supplies decrease and the cost of Middle East oil makes these alternatives relatively more economical, or when national security requires an on-line production capability for them, the water-energy resources linkage will have its greatest impact. All of these alternatives require large quantities of water and have a potentially deleterious impact on water resources.

The petroleum industry is now using water in large quantities for enhanced petroleum recovery from oil fields. The secondary recovery method uses injected water to push oil to the surface. About 25 percent of the oil pumped from wells in the United States during 1977 was obtained using this method. A new method called tertiary recovery uses either steam or carbon dioxide to loosen the oil from rock deposits, and an even more recent technique uses water and detergent. Less than 3 percent of the oil pumped in 1977 was obtained using tertiary recovery, but the method is being more widely considered. Regardless of the recovery method, however, there will be a requirement and competition for large quantities of water.

Currently, one controversial method of using water resources for energy is the proposed transport of coal in a slurry form by pipeline. The nation's railroads will not be able to handle all of the coal that would be required to replace oil, so some other means of transportation will be required. The cost to transport by pipeline is reportedly cheaper than by rail. In any event, the pipeline is viewed as an alternate means of transport despite the fact that only one system, the Mojave Generating Plant in Nevada, is currently operating.

Wyoming approved a request for a permit to use that state's water for a proposed 1,043-mile-long pipeline to Arkansas on the basis that the aquifer, or underground natural water system, contained enough water for the requirement. Subsequently, South Dakota ranchers sued, claiming the aquifer depletion would affect their wells. Pending resolution of the issue, Colorado and Oklahoma have ruled that

water may not be removed from their states by a slurry pipeline.

As an alternative to the Wyoming problem, the possibility of using saline water or sewage was explored; but this proved unsuccessful because of corrosive effects or insufficient quantities. A related problem is cleaning the water for reuse after it is removed from the slurry pipeline. The particles in slurry wastewater are so fine that an effective removal system has yet to be designed. For this reason, the Mojave Plant has been prohibited from discharging its wastewater into the Colorado River.

Besides transportation, there are other aspects of energy production involving coal which also utilize water resources. The coal liquification process, for example, requires large quantities of water to make syncrude, a synthetic fuel. Estimates of the amount of water needed to produce one barrel of syncrude range from 175 to 1,130 gallons.<sup>3</sup> Unfortunately, this requirement is complicated by the fact that much of the country's coal reserve is located in areas already having high water demands. For example, about 50 percent of the total recoverable coal reserves and 30 percent of the surface-mineable reserves are in the Ohio and Upper Mississippi regions which have major water demand requirements.<sup>4</sup>

Conversion of coal to syncrude requires more water than oil-shale mining, but oil shale has its own water-related problems. For example, shale deposits in Colorado are an integral factor in groundwater flow and quality, and any disruption of these deposits could affect the flow of the White, the Green, and the Colorado rivers.<sup>5</sup> Such complex energy-water links will

<sup>3</sup>William D. Wiard, Energy Section, Systems Acquisition Strategy Study, Headquarters, Air Force Systems Command, Andrews Air Force Base, MD, October 1977.

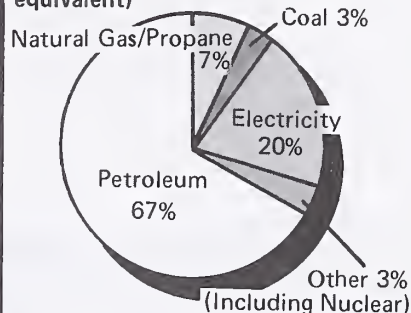
<sup>4</sup>John Harte and Mohamed El-Gasseir, "Energy and Water," Science, February 1978, p. 627. (This excellent paper makes quantitative comparisons of water requirements of energy sources and concludes that freshwater availability is likely to severely constrain future energy development.)

<sup>5</sup>Ibid., p. 628.

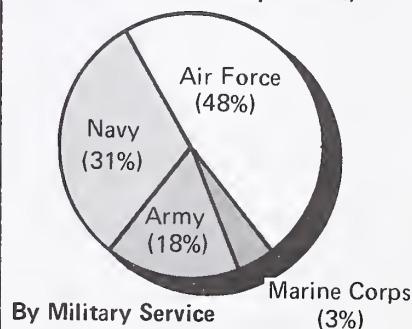
## Energy Consumed in Fiscal Year 1977



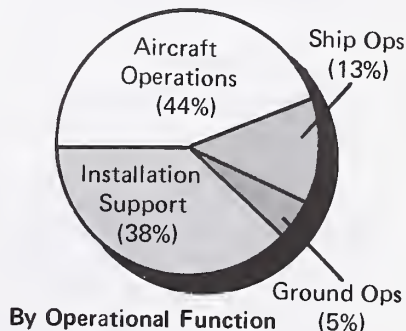
U.S. Total Consumption (estimated at 13,620 million barrels of oil equivalent)



DoD Energy by Source (260 million barrels of oil equivalent)



By Military Service



By Operational Function

Source: Department of Defense Annual Report, FY 1979



necessitate trade-offs between using water for fossil-fuel production and satisfying the myriad demands of industry, government, and agriculture.

The use of coal and uranium for generating electricity also places heavy demands on water as a cooling medium. A light-water nuclear reactor requires 39 to 59 percent more water than a coal or petroleum plant with a comparable output. Dry cooling or seawater for cooling obviates the demand for freshwater but has other consequences. Dry cooling in coal-fired plants lowers thermal efficiency and requires more coal. Subsequently, additional water is needed at the mining location for mining and reclamation. The use of seawater for cooling imposes an obvious geographic limitation on plant location.<sup>6</sup>

The most direct use of water in energy production—hydropower genera-

tion—also competes with other demands for available water. Hydropower provided only 14.7 percent of the nation's electricity in 1975, but recent reports suggest that many small communities are reviving old hydroelectric plants for economic reasons, particularly in the Northeastern United States and in Southeastern Alaska.

Hydropower plants competing for water resources seem fairly innocuous, because they usually use water by withdrawing and returning it for other uses. In 1975, the estimated cumulative withdrawal of water for hydroelectric generation in the United States was 3.3 trillion gallons per day, a 20 percent increase from 1970. Although this amount includes the water which flowed through the turbines and was pumped back above the plant for reuse, it was drawn from a total in-stream supply of only 1.2 trillion gallons per day. This sup-

ply includes 420 billion gallons per day withdrawn for off-channel uses other than hydropower. An enormous amount of evaporation from storage reservoirs also takes place at an estimated 11 billion gallons per day in the 17 western states alone. This gives an indication of the magnitude and competitive strength of hydropower in the use of water.<sup>7</sup>

Biological conversion of organics is frequently mentioned as an alternative gaseous and liquid-fuel production method. The potential of this method is undisputed, but proponents seldom mention the quantities of water required for irrigation in order to maximize production. In a large-scale operation, the quantities required would, in many cases, exceed all of the affected area's locally available surface water. In fact, the only energy sources in which water is not a major factor are the sun and wind, and more definitive study on their water requirements is necessary.

In addition to the technical aspects of the water-energy linkage, there are socioeconomic ramifications that could affect national security. This aspect of the energy-water connection constitutes a more subtle yet equally important challenge for the defense manager.

The diversion of economic resources to resolve energy problems, together with the American public's perceptions of the impact on its life-style, will have a significant effect on Federal domestic policy. There is no way to accurately assess the impact that water and petroleum problems will have on the United States, but domestic social problems may occur. While other nations will also suffer from the petroleum shortage, the United States is the most dependent on petroleum and will be the most heavily affected.

As such, threats to U.S. interests in any part of the world would surely test the national will. How would lowered standards of living brought about by petroleum and water problems affect the American public's willingness to

### The Energy-Water Resources Link

Energy Alternative	Water Impact
Oil -- Enhanced Recovery	Uses large quantities of injected water and steam
Oil Shale	Disrupts groundwater flow and quality
Coal -- Slurry Pipeline	Degrades water quality
Syncrude	175 to 1,130 gallons of water to produce 1 barrel of syncrude
Electricity -- Coal and Nuclear Generated	Large quantities of water for cooling
Electricity -- Hydropower	Used 3,300 billion gallons per day (1975 U.S. estimate)
Gas and Liquid Fuel -- Bioconversion of Organics	Large quantities for irrigation
Solar/Wind	Minimal water requirement -- more study needed

“Moreover, there is no way to foretell public reaction when the demand for alternatives to petroleum aggravates water-resources availability problems.”

<sup>6</sup>*Ibid.*, p. 628.

<sup>7</sup>U.S., Department of the Interior, Geological Survey, Estimated Use of Water in the United States in 1975, *Geological Survey Circular 765* (Washington, D.C.: Government Printing Office, 1977), p. 8.





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“Regardless of the recovery method, however, there will be a requirement and competition for large quantities of water.”

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support overseas commitments? For example, would there be public support to help a foreign nation when this would divert scarce petroleum and related water resources from the U.S. economy? (According to the Defense Energy Information System, during fiscal year 1977 petroleum accounted for 67 percent of the total energy used by DoD.) Twenty-five years from now, would the American public be willing to divert a significant portion of domestic crude oil and the water needed to obtain and refine it in order to sustain an overseas conflict?

These are hard questions. In today's environment, strict energy conservation and other corrective actions are apparently unacceptable political risks, distasteful except in localized emergencies. Unfortunately, it appears that the situation must reach crisis proportions before these risks become acceptable. When the situation has deteriorated to that point, the lead time required for corrective actions, particu-

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<sup>8</sup>Dietrich Stroeh, "What Do You Do When You're Out of Water?" American City and County, December 1977, p. 49.

larly for new power-generation and surface-water storage facilities, will generate continued hardships for a number of years. Local controversies may become commonplace on such issues as whether water will be used for offstream irrigation or remain instream for hydropower, and whether it should be stored for hydropower or released to support municipal requirements when low-stream flows occur.

Strongly linked to energy, water plays a major role in most of the alternative energy sources. Unfortunately, the advocates of these alternatives do not address the trade-offs associated with competing for limited water resources.

From an optimistic viewpoint, the problems with energy and water can be solved through technology and a concerted public will. An example of this occurred in Marin County, California, where drought and emergency conditions necessitated rationing water at an average allotment of 46 gallons per person per day. The goal was to achieve a consumption of 12.5 million gallons per day from a normal usage of 30-33 million gallons per day. Customers actually held consumption to 8.5 million gallons per day, but the cost for water did not decrease. Instead, unit-water prices in Marin County doubled in 1977, and the acquisition of new water is expected to cost 50 to 75 percent more.<sup>8</sup>

Despite such local examples, there is no visible evidence to suggest that the nation as a whole recognizes the energy-water connection. If the United States is to avert life-style changes, unwarranted economic stresses, and greater vulnerability to external challenges, the energy-water connection must be quickly incorporated into the policy-making process. **DMJ**

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*LIEUTENANT COLONEL RAY D. SCHWARTZ, USAF, is Commander of the 82d Civil Engineering Squadron, Williams Air Force Base, Arizona. He has served in a number of engineering positions and holds a master's degree in public administration from the University of Maryland.*

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# Discount Rate Selection

*By Robert Shishko*

*In his article, "Should Defense Managers Discount Future Costs" (March 1978 DMJ), Cdr. Rolf H. Clark questioned the appropriateness of the discounting policy applied in the Department of Defense. Disagreeing with the thrust of that article, James S. Blandin and Peter C. Frederiksen of the Naval Postgraduate School contributed "The Role of Discounting in Problems of Choice" (November 1978 DMJ). Now in this article, an economist with the Rand Corporation presents yet another perspective, addressing in theoretical terms the importance of global conditions as a variable in the discounting methodology.*

**D**iscounting, the technique by which resources produced or consumed in different time periods can be made commensurable, has been the subject of much debate within the economics profession. Although most economists believe that discounting is the correct way to reduce a stream of costs or benefits to a single number so that one stream can be compared with another, there is much disagreement over the appropriate rate to apply in actual decisions. Many economists believe that many Government projects which would be rejected by the private sector are funded by the Government because an inappropriate discount rate is used.

A project that shows a positive present discounted value (PDV) at a 5-percent discount rate may show a negative PDV at a 10-percent discount rate. As such, the choice of the discount rate may very well determine the acceptance or rejection of a particular project even when there is a consensus on the costs and benefits of the undertaking.

One source of confusion involves the difference between the nominal and real discount rates. There are two ways to calculate the present discounted value. One can deal in real dollars (dollars adjusted to some fixed-price level) and discount by the real rate, or one can deal in nominal dollars (sometimes called then-year dollars) and discount by the nominal discount rate, that being the real discount rate plus the expected rate of inflation. If the base year is the same, the two methods yield identical results.

## *Discount Rate Selection*

There are two basic views on discount-rate selection methods. The first view is that the discount rate should reflect the social-opportunity cost of capital, which is also known as the intertemporal marginal rate of transformation (MRT). According to this view, only by discounting future costs and benefits at the rate that could be earned by the best alternative private project can society be guaranteed that a public undertaking will not displace a private undertaking which would result in a higher yield.

Central to this view is the fact that the social-opportunity cost of capital can be measured. There have been many attempts to measure the opportunity cost of capital.



# for Defense Decision Making

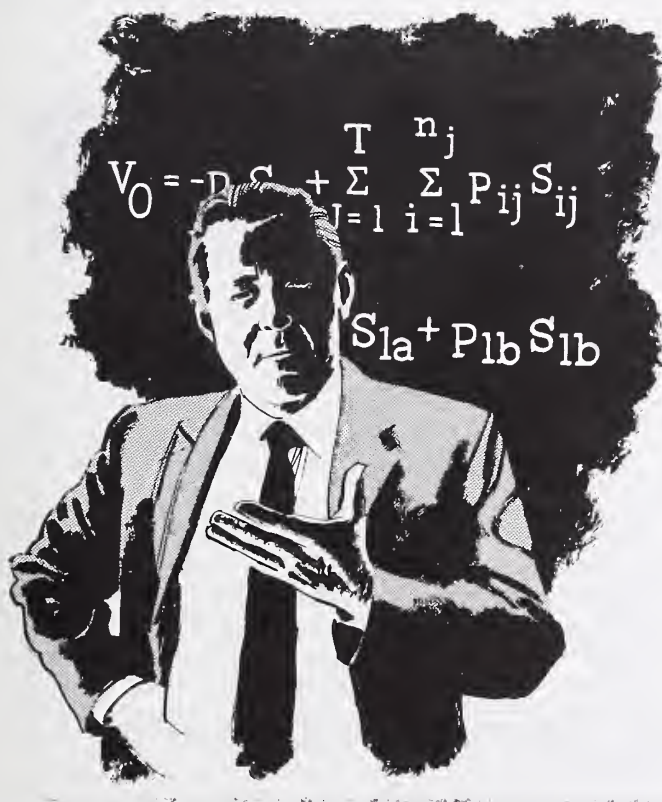
The most widely acknowledged of these are separate studies by Harberger,<sup>1</sup> Stockfish,<sup>2</sup> and Haveman.<sup>3</sup> The basic methodology is to make an assumption about how the marginal dollar of resources will be obtained (by borrowing or taxing), and to estimate the incidence of the additional taxes or borrowing on various capital-using sectors. The estimates are the factors by which the pre-tax rate of return on capital in each sector is multiplied.

The second major view on discount-rate selection is that one should use society's rate of time preference, which is also called the intertemporal marginal rate of substitution (MRS). In an ideal world with no taxes, externalities, or market imperfections driving a wedge between society's MRT and MRS, the opportunity-cost rate and time-preference rate would be the same. In the real world,

however, taxes, differential costs of information, and monopolies act to create a difference between these rates. Some adherents to the time-preference view suggest that society's MRS can be inferred from household decisions regarding savings and consumption, or borrowing and lending. Other economists suggest that the MRS is different for different classes of projects, and that for a particular class of project, the MRS is whatever society wants it to be. Still other economists suggest that it can be inferred from the results of public referenda.

In separate articles by Marglin<sup>4</sup> and Feldstein,<sup>5</sup> a strong case has been made for ignoring current market decisions by individuals. In essence, these authors believe that individuals are irrationally myopic, that future generations are underrepresented in current capital markets, and that society, acting collectively, may desire a distribution of income among generations different from which it generated through individual behavior. Accordingly, it would not be inconsistent to borrow at 15 percent to increase current consumption while voting increased taxes for a project yielding 8 percent, because through taxation, many individuals could be compelled to contribute to the project.

If this argument is accepted, the proper policy would be to lower the market rate of interest for all investments by using monetary and fiscal instruments. At the lower interest rate, the rate of return required by investors



<sup>1</sup>Arnold Harberger, "On Measuring the Social-Opportunity Cost of Public Funds," The Discount Rate in Public Investment Evaluation, *Western Agricultural Economics Research Council, Denver, Colorado, December 1968*.

<sup>2</sup>Jacob Stockfish, "Measuring the Opportunity Cost of Government Investment," *Institute for Defense Analyses, Arlington, Virginia, March 1969*.

<sup>3</sup>Robert Haveman, "The Opportunity Cost of Displaced Private Spending and the Social Discount Rate," *Water Resources Research, Volume 5, October 1969, pp. 947-957*.

<sup>4</sup>Stephen A. Marglin, "The Social Rate of Discount and the Optimal Rate of Investment," *Quarterly Journal of Economics, Volume 77, February 1963, pp. 95-112*.

<sup>5</sup>Martin S. Feldstein, "The Social Time Preference Discount Rate in Cost-Benefit Analysis," *Economic Journal, Volume 74, June 1974, pp. 360-379*.

would also be lower, leading presumably to the acceptance of some previously rejected projects. If monetary and fiscal policies can be used to reduce the interest rate, then a separate social-discount rate is unnecessary; but if the use of monetary and fiscal policies is inhibited, then an alternative would be to use a social-discount rate lower perhaps than either the MRT or MRS. Such a move, however, would be extreme.

Despite appearances to the contrary, the two views do overlap. Harberger's calculation of the social-opportunity cost of capital includes the after-personal-income-tax rate of return on savings, which is presumably related to the rate of time preference. Several authors, using a two-period model, have shown that with no externalities in either government or private investment in the first period, the appropriate discount rate is a weighted average of the intertemporal MRT and intertemporal MRS, the weight attached to the MRT being the proportion of the marginal dollar of government investment drawn from private investment. On this last point, some economists have argued that government investment produces positive spill-over on private investment. They argue that although a dollar of government investment may displace some private capital formation, the flow of services from the government project may actually increase private capital formation.

As an example, one might expect some positive effects on private investment from government investment in the economic infrastructure. Under the assumption that the output from an additional dollar of government invest-

ment increases private investment by exactly the same amount that private investment is decreased as a result of government financing, the appropriate discount rate, according to the hybrid view, is the intertemporal MRS. However, under the assumption that an additional dollar of government investment displaces one dollar of private investment with no positive external effect in the other direction, the government should use a discount rate equal to the intertemporal MRT.

### *Numerical Estimation and Risk*

Discount-rate theory aside, consider some of the numerical recommendations that have been made by economists. In all applicable cases in Figure 1, real-discount rates were calculated by subtracting a geometrically computed average of the inflation rate during the six years preceding the year of the estimate.

The range of the recommended real-discount rates is the result of the different assumptions made by each author. Haveman's 6-percent recommendation might be favored by those who adhere to time-preference theory. Estimates between 7.5 percent and 10 percent probably reflect weightings of the social-opportunity cost and time-preference rates.

Even in the absence of uncertainty about future benefits and costs, it remains necessary to discount. Some authors have recommended that a project-specific risk premium be attached to a risk-free discount rate to account for inherent project uncertainty. Others have argued that uncertainty is not necessarily an exponential or even

**Figure 1. Recommendations on the Discount Rate**

Author	Year of Nominal Rate	Recommended Nominal Rate (%)	Adjusted for Expected Inflation (%)*
Krutilla and Eckstein	1958	6.0	4.58
Hirshleifer, De Haven, and Milliman	1960	10.0	8.39
Bain, Caves, and Margolis	1966	6.0	4.65
Haveman	1966	7.3	5.95
DoD Directive 7041.3, December 1966	1966	-----	10.00
Stockfish	1949-1965	12.0	10.67
Harberger	1968	10.7	8.33
Baumol	1968	10.0	7.65
OMB Circular No. A-94, March 1972	1972	-----	10.00
Dorfman	1975	-----	7.50

\*The adjustment of expected inflation was made by calculating a geometric average of the rates of inflation in the six years prior to the year of the estimate and subtracting it from the nominal rate.



a monotonic function of time, and therefore cannot be correctly handled through the discounting procedure.

When using data from the private sector, the question of whether to include risk premia arises, because as the inherent private riskiness becomes greater, so does the observed rate of return. Moreover, there is some question as to whether the Government should have to earn this higher rate of return when it undertakes a risky project. But the primary issue is whether private risk is also a social risk. The argument that a private risk is not a social risk is based on the view that when risks associated with individual projects are pooled and averaged over the entire population, the social risk approaches zero. Therefore, for purposes of calculating the social-opportunity cost, one should use the rate of return less the risk premium.

The counter-argument is that the pooling of risks is not sufficient to reduce the social risk to zero. A necessary condition for a zero social risk is a zero average covariance among the rates of return. This, of course, can occur if the rate of return on each project is an independent random variable, or if there is a significant negative covariance among some projects. The existence of business cycles is some indication that individual rates of return are positively correlated. In other words, if the rate of return to a particular project is correlated with national income, the social risk cannot be zero. After all, monetary and fiscal policy are not perfect instruments of national income management.

Furthermore, economists opposing the use of a riskless discount rate correctly observe that the private investor can diversify his portfolio at negligible marginal cost by participating in stock markets. The individual can reduce his private risk to the average covariance among projects, which is an irreducible social risk. Therefore, the pooling argument is valid only if the government can provide more efficient diversification for risk-bearing than can private markets.

Although there are a number of techniques for handling uncertainty in present discounted-value calculations, I recommend incorporating the major uncertainties. This can be done by identifying alternative states of the world in which materially different benefits and costs may be realized, and then calculating the present certainty-equivalent value.

## The State-Preference Approach

This concept, known as the state-preference approach,<sup>6</sup> is ideally suited for an analysis of the appropriate discount rate under uncertainty. Under the state-preference approach, the outcome of a given investment in any subsequent period depends on the state or condition of the world in that period. The exact state of the world in some future period is naturally uncertain; however, under the state-preference approach, it is assumed that all possible future states can be enumerated. It is also assumed that those future conditions are mutually exclusive. These two assumptions are not altogether unreasonable if the

relevant states of the world vastly differ from one another, as for example, war versus peace or prosperity versus depression.

A private investor will rationally want to contemplate the return he will obtain in each relevant future state. Income investment will differ depending on the particular future state. Therefore, the risk-average investor exchanges his claims on future income in some states for claims on future income in other states. The establishment of markets for various contingent claims on future income will enable the private investor to make the necessary transactions and achieve the desired diversification. A perfectly competitive market in contingent claims on future income produces the usual Pareto efficiency, whereby no individual can be made better off without making someone else worse off. Independent trading decisions made by many individuals establish a set of prices to be paid now for one dollar of income in each of many future world states. These prices naturally reflect the market's collective wisdom about the probabilities of the future existence of a relevant state, the relative desirability of income in each state, and the time preference.

Using the prices established for contingent claims, one can specify a government-investment decision rule that generalizes the familiar present-value criterion from the riskless to the risky case. The rule is that the government ought to do all projects whose percent certainty-equivalent value is greater than zero. The PCEV is represented as

$$V_o = -p_o C_o + \sum_{j=1}^T \sum_{i=1}^{n_j} p_{ij} S_{ij}, \quad (1)$$

where

$V_o$  = PCEV

$p_o$  = price of current claims, generally taken as 1

$C_o$  = current cost

$S_{ij}$  = net dollar benefits in state  $i$  and period  $j$

$p_{ij}$  = state-time price paid now to obtain one dollar in state  $i$  and period  $j$ .

A simple example may help illustrate this rule. Suppose there is one future period in which one of two possible states must occur, such as war or peace. Suppose further that all costs are incurred in the present and all benefits are realized in the future time period. The PCEV would then be represented as

$$V_o = -C_o + p_{1a} S_{1a} + p_{1b} S_{1b}, \quad (2)$$

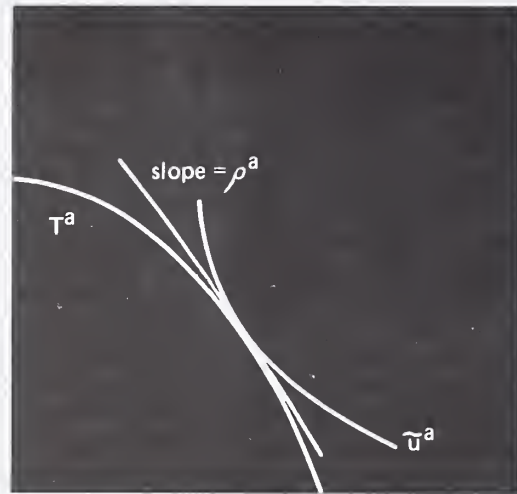
where

$S_{1a}$  = benefits in state  $a$

$S_{1b}$  = benefits in state  $b$

<sup>6</sup>See Jack Hirshleifer, "Investment Decisions Under Uncertainty: Applications of the State Preference Approach," *Quarterly Journal of Economics*, May 1966, pp. 252-277.

Figure 2. Discount Factor in State a



Present Consumption of Public Goods

▲ Future Consumption of Public Goods

$p_{1a}$  = prices in state a  
 $p_{1b}$  = prices in state b.

It is possible to express the price of a certain future claim as  $p_1$  by observing that such a claim can be purchased for  $p_{1a} + p_{1b}$ . Alternatively, if  $S_{1a} = S_{1b}$ , there is no uncertainty and again the contingent price is  $p_{1a} + p_{1b}$ . This leads directly to the definition of a riskless discount factor,  $\rho_1 = 1 +$  the discount rate, in a world with uncertainty; namely

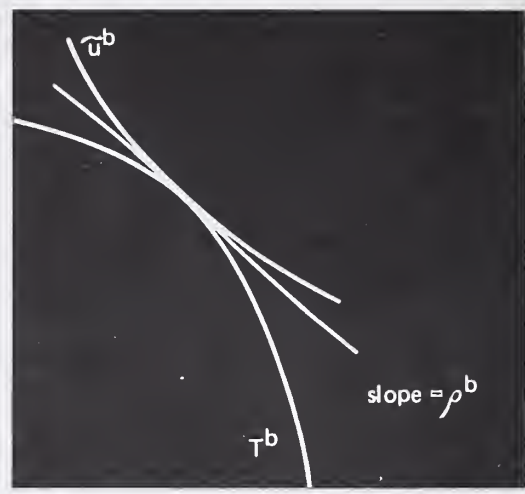
$$\frac{1}{\rho_1} = p_1 = p_{1a} + p_{1b} \quad (3)$$

To apply the state-preference approach to the choice of the discount rate, we must be able to relate the prices in Equation (1) or (2) to society's resource constraints and tastes. Suppose again there is one future period and two possible states, a and b, for this period. Society's opportunities to trade current consumption for future consumption on the margin in state a can be represented by the curve labeled  $T^a$  in Figure 2. The curve  $T^a$  has been deliberately drawn to reflect the condition that increasingly greater amounts of current consumption must be sacrificed in order to gain equal increments of future consumption. The rate at which society can exchange current consumption for future consumption on the margin is just the slope of  $T^a$  at any point.

Similarly, in state b (see Figure 3), society can also trade current consumption for future consumption, though the curve representing the rate at which this can be done may be different.

Let us assume the government maximizes society's utility in each state by choosing the point along  $T^a$  or  $T^b$  at which any feasible movement would leave society

Figure 3. Discount Factor in State b



Present Consumption of Public Goods

▲ Future Consumption of Public Goods

worse off. This optimal point occurs where the rate at which society can trade current consumption for future consumption is equal to the rate at which society is willing on the margin to make that exchange. The willingness in state a to exchange current consumption for future consumption is represented by the curve  $u^a$  in Figure 2. The slope at the tangency of  $T^a$  and  $u^a$  defines the appropriate discount factor for state a. By a similar process, the appropriate discount factor for state b is the slope at the tangency of  $T^b$  and  $u^b$  in Figure 3.

Slopes  $\rho^a$  and  $\rho^b$ , however, need not be equal. This is the essence of the state-preference approach. Different tastes or resource constraints arising in different states of the world result in different discount rates for each state. If we know for sure that state a will occur, then the appropriate state-preference price would simply be the reciprocal of  $\rho^a$ . Of course the future is not known with certainty, but we can still calculate the appropriate state-preference prices for contingent claims if we adjust each discount factor by the probability of that state occurring. If we let  $\pi^a$  be the probability that state a will occur and let  $\pi^b = 1 - \pi^a$  be the probability that state b will occur, then

$$p_{1a} = \frac{\pi^a}{\rho^a} \quad (4a)$$

and

$$p_{1b} = \frac{1 - \pi^a}{\rho^b} \quad (4b)$$

### Comparing Discounting Procedures

We can now use the state-preference theory to compare



various discounting procedures. A 1975 study<sup>7</sup> concerning the automation of the Navy's FF-1052 class escorts addressed the issue. An investment in certain equipment for the FF-1052 will produce dollar savings by allowing for a reduction in shipboard manning. These savings are roughly proportional to the number of ships of the FF-1052 class that are so automated. Let us consider two possible future world states, peace and war. If peace, which is also the current state of the world, continues through the next period, a certain level of savings will occur. If war occurs, the level of savings realized will undoubtedly be smaller because some portion of the ships will be lost in combat. However, a dollar's worth of savings may be valued differently in war than in peace. It is contended that during war, a dollar's worth of savings may be valued higher because resources are scarcer. Even though the total dollar savings are less, the value attached to each dollar is higher, creating a partially offsetting effect.

If the probability of war is small, some analysts are inclined to discount only the savings that occur in peacetime. Other analysts may calculate the expected savings and then discount. Five discounting procedures that exhibit varying degrees of sophistication are presented below.

Let state a be peace and state b war, and suppose the probability of war ( $1 - \pi^a$ ) is small. We may calculate the present value of the proposed automation of the FF-1052 by one of five equations:

$$V_o = -C_o + \frac{S_{la}}{\rho_1} \quad (5a)$$

$$V_o = -C_o + \frac{S_{la}}{\rho^a} \quad (5b)$$

$$V_o = -C_o + \frac{\pi^a S_{la} + (1 - \pi^a) S_{lb}}{\rho_1} \quad (5c)$$

$$V_o = -C_o + \frac{\pi^a S_{la} + (1 - \pi^a) S_{lb}}{\rho^a} \quad (5d)$$

or

$$V_o = -C_o + \left( \frac{\pi^a}{\rho^a} \right) S_{la} + \left( \frac{1 - \pi^a}{\rho^b} \right) S_{lb} \quad (5e)$$

where

$C_o$  = the investment cost of the proposed automation

$S_{la}$  = the realized savings if future state a occurs

$S_{lb}$  = the realized savings if future state b occurs

$\rho_1$  = the riskless discount factor (Equation (3)).

In Equations (5a) and (5b), the most likely benefits are discounted respectively by the riskless rate, and the riskless rate applicable to the most likely state. Equation (5c) is actually the procedure whereby expected savings are discounted by the riskless rate.<sup>8</sup> In Equation (5d), which is similar to Equation (5c), the expected savings are discounted by the (riskless) rate applicable to the most likely state. Equation (5e) is actually the PCEV. Here the savings in each state are valued by the prices for contingent claims in that state.

A numerical example helps illustrate how the choice of the discounting procedure can affect the decision to accept or reject a proposed project. Suppose the following values hold:  $\pi^a = 0.9$ ,  $C_o = 1.1$ ,  $S_{la} = 1.50$ ,  $S_{lb} = 0.50$ ,  $\rho^a = 1.30$  and  $\rho^b = 1.05$ . In state b (war), I have assumed that only one-third of the FF-1052s will survive, so  $S_{lb}$  is only one-third of  $S_{la}$ . From the information above,  $\rho_1 = 1.27$ . Figure 4 provides the present values calculated from Equations (5a) through (5e).

**Figure 4. Present Values for Hypothetical Automation Project Using Different Discount Procedures**

Equation	$V_o$
5a	+0.081
5b	+0.054
5c	+0.003
5d	-0.023
5e	-0.014

If Equations (5a) and (5b) are used to evaluate the proposed automation, the project will be accepted; if Equations (5d) and (5e) are used, the project will be rejected; and if Equation (5c) is used, the project roughly breaks even. The selection of the discount procedure is probably more important for the acceptance or rejection of a given project than is the choice of the discount rate per se. What one counts as part of the benefits in future periods and how one incorporates those benefits into the present value calculation are nonnegligible considerations.

<sup>7</sup>Robert Shishko, "The Economics of Naval Ship Automation: An Analysis of Proposed Automation of the DE-1052," The Rand Corporation, November 1975.

<sup>8</sup>K.J. Arrow and Robert C. Lind, "Uncertainty and the Evaluation of Public Investment Decisions," American Economic Review, Volume 60, June 1970, pp. 364-378.

I need not have picked for my working example two such radically different world states as war and peace to illustrate this point for military investments. Consider for a moment several peaceful states of the world  $a_1, a_2, \dots, a_n$ , in which the adversary has achieved various degrees of success in countermeasures. For example, in the case of the automation of the FF-1052, the opponent may have developed a way to make our FF-1052 so vulnerable that we decide to retire it. In that case the downstream benefits of automation will not be realized.

If the probabilities of achieving various degrees of success in countermeasures were known, we could treat this problem using the state-preference approach. To illustrate in a simple model how the ability of the opponent to develop countermeasures which reduce the benefits of a military project can be dealt with analytically, let there be two future world states: one in which no countermeasure is deployed, and one in which a countermeasure is deployed. Suppose the benefits in all future periods  $j = 1, 2, \dots, T$  are  $S$  if state  $a$  occurs and zero if state  $a^1$  occurs. The current cost of the project is  $C_0$ . The present certainty equivalent value is represented by

$$V_0 = -C_0 + S \sum_{j=1}^T \left( \frac{\pi_j^a}{\rho_j^a} \right), \quad (6a)$$

where

$\pi_j^a$  = the probability that state  $a$  will occur in future period  $j$

$\rho_j^a$  = the appropriate discount factor for state  $a$  in period  $j$ .

If we assume that in each period there is a constant probability that no countermeasure will be deployed and that  $\rho_j$  is just a constant  $\rho$  compounded  $j$  times, then Equation (6a) can be rewritten as

$$V_0 = -C_0 + S \sum_{j=1}^T \left( \frac{\pi}{\rho} \right)^j. \quad (6b)$$

Is it possible to treat the formulation in (6b) as if the benefits  $S$  are certain, but discounted at  $\rho$  plus a risk premium? In other words, is there a  $\delta$  such that

$$\left( \frac{\pi}{\rho} \right)^j = \left( \frac{1}{\rho + \delta} \right)^j \quad ? \quad (7)$$

Equation (7) is easily solved for  $\delta$ , and one obtains  $\delta = \delta(\rho) = \left( \frac{1-\pi}{\pi} \right) \rho$ . The appropriate risk premium is proportional to  $\rho$ . For example, if  $\pi = 0.9$ , then  $\delta = 0.11 \rho$ ; if  $\rho = 0.09$ , then  $\rho + \delta = 0.10$ .

But if the probability of countermeasure deployment in each period varies from period to period, the risk premia are not constant over time. And if the probability of

countermeasure deployment increases in each period, the appropriate risk premia also increase.

In general, attaching a period-specific risk premium to the discount rate in each period may be formally equivalent to accounting for alternative states of the world, but it should be clear that no universal set of premia will work for all projects; each project's own risk pattern must be considered.

## Strategic Considerations

The rate of return on a military investment is, to a certain degree, under the control of the opponent who may choose to divert resources to countermeasures. The more resources devoted to countermeasures, presumably the greater the opponent's chance of success. On the average, though, the probability of the opponent achieving a countermeasure is not independent of the number of different projects undertaken. The existence of many projects dilutes the opponent's ability to commit his limited resources to countering any one of them. If an opponent has a limited budget for countermeasures and is maximizing his utility subject to that constraint, the introduction of a new project diverts funds that could have been used to counter the original set of projects. Generally, the probability of achieving a countermeasure on each of these projects is lower. Success in countering one project will likely correlate negatively to success in countering the rest of the portfolio. In other words, for a portfolio of military projects, the covariance between the rate of return on a new project and the rate of return on an existing portfolio of projects is likely to be negative.

Compare this to a new civilian project. The covariance between the rate of return on a new civilian project and the rate of return on the existing portfolio could be positive, negative, or zero; but the larger the original portfolio, the more it resembles national income—the more likely the covariance is to be positive. Thus, the pooling argument often advanced for civilian projects must a fortiori be stronger for military projects.

## In Summary

The choice of the discount rate is just a part of the larger issue. In evaluating public investments, particularly in military projects, states of the world in which tastes, production possibilities, or benefits may differ from those of the current state are too often ignored. It should be possible to improve our assessments of military projects if the effect of possible countermeasures is directly incorporated into the present-value calculations.

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# Aircraft Acquisition the Slabovian Way

*By Russell M. Genet*

*Grab your gloves and heavy coat  
and come along  
as we take a tongue-in-cheek look  
at a serious subject.*

**W**hile everyone, I believe, has heard of our sister country, Lower Slabovia, my country, Upper Slabovia, enjoys the kind of obscurity generally reserved for offensive linemen and individuals appearing in Slabovian Express ads. All kidding aside, though, we like it that way. Suffice it to say that ours is a small, neutral nation whose capital you may or may not recall from eighth-grade geography.

And how, you may ask, do we maintain our neutrality during this period of international tug-of-war? Well, one reason is the Upper Slabovian Air Force, which acquires and supports its aircraft in Scrooge-like fashion. Let me tell you a little about it.

The shoulder-high snow and sub-zero temperatures of Upper Slabovia are legendary, and our people are well-adapted to such a harsh environment. (You might recall that we won the bronze medal in bare-handed ice fishing in the last winter Olympics.) Nonetheless, we still have to heat our homes, and with fuel and consumables costing what they do, a large and expensive air force is economically out of the question. You see, in our country, funds to develop, acquire, and operate aircraft are as fixed as a neutered cat, and inflation is as persistent as a barking dogma. (Excuse me, I can't help myself sometimes.) So we must, if I may borrow one of your pet expressions, get the most bang for the buck.

Although we are naturally quite concerned about the initial cost of our aircraft, we are even more concerned about the rocketing cost of operating and supporting them. These days, maintaining a plane is a lot more expensive than buying one, and nothing strains a fixed budget faster than support cost run amok. Before you know it, operating and support expenditures can take a big bite out of the money earmarked for the acquisition of new aircraft. And we must have new aircraft if we are to defend and maintain our neutrality!

Although this problem of achieving a propitious balance between acquisition and support costs is common to many of our neighboring countries, its solution has been as elusive as a good soybean harvest. But here in Upper Slabovia, we think we have the answer.

Once we determine a need for a new aircraft, we thoroughly analyze the development, production, and lifetime support costs of similar aircraft already in the inventory. Based on projections made from this data, we set an absolutely fixed amount of slovars that we are willing to spend on the aircraft over its entire life. This slovar limit is for a given number of *useful* aircraft. In Upper Slabovia, we do not consider an aircraft useful when it is in the hangar for maintenance, overhaul, or modification. I've heard whispers that on several occasions, certain individuals who ignored fiscal guidelines received a permanent change of station north to Sloberia, where people work in yogurt factories and exercise to stay warm.

The case of our frequently promenaded C-3 cargo aircraft is useful in illustrating some of my points. In the case of the C-3, we set the total-life cost at 500 million slovars for 100 useful aircraft. As each component of the

C-3 was designed or chosen, the aircraft's projected 30-year cost was estimated. Incidentally, our design staff is quite experienced and has the benefit of aviation chronicles dating back to the turn of the century. (As any proud young Slabovian can tell you, we were the first to fly. But you don't have to believe me: you can look it up in any Slabovian history book.)

Paying more for better-designed and more reliable aircraft usually pays dividends in the long run. We have discovered, regrettably, that new equipment often fails to live up to its purported reliability. So, whenever possible, we use tried and proven commercial items and components for our aircraft.

For items or components with which we have no real experience but which have done well elsewhere, we like to buy several and check them out. This of course necessitates also purchasing a set of test equipment and the necessary technical literature. We then send our technicians for factory training, and when they return we conduct field- and depot-maintenance tests.

**P**erhaps I shouldn't be telling you all this, but not only do we evaluate the adequacy of the technical literature and test equipment, we also determine what it will cost to support the item in the expected operating environment. What's more, on those major items requiring depot-level repair, we insist that the depot's evaluation, which we pay for as part of development, result in a firm fixed offer regarding cost per repair.

When requirements for such necessities as retractable





skis and a detachable snow plow can't be met by off-the-shelf items, we contract out for their special manufacture. In those cases, we always insist on a warranty from the contractor, even if we have to pay a little more. Our warranties must cover field and depot repair costs. It goes without saying that we would never be so foolish as to buy an unproven or unwarranted item. As my little book of proverbs says, "Let them put their money where their mouth is."

By the way, reliable informants report that in some countries, aircraft acquisition is based strictly on the lowest purchase price. Such a practice seems horrifying—and I don't even have to fly the planes.

Our designers pay particular attention to those small components whose failure can ground an aircraft. These items include such seemingly mundane items as valves, actuators, and fuel indicators. Having a costly and sophisticated aircraft grounded because of a defective 40-slovar valve is enough to send Sloberian-like chills down my spine.

At first glance, it may seem a bit expensive and time consuming to go to such great pains to ensure reliability, availability, and maintainability. Well, quite frankly, it is. More than 30 percent of our research and development budget is spent on this. It can even add as much as two years to development time. But that's okay because we Slabovians are accustomed to things taking longer than was originally expected. This is especially true for five-year economic growth plans. When it comes to support costs, our unique and original motto is, "A good surprise is no surprise."

We also design our aircraft in a way that allows us to add new capabilities to them as advances in technology are made. This safeguards against obsolescence and paves the way for an aircraft life span of up to 30 or 40 years.

**A**fter our designers have "done their thing," if you'll excuse my Western idiom, we begin initial production. While most nations order a handful of prototypes for special evaluation, we generally order an entire squadron. Following a safety check, the aircraft are deployed in the usual manner. Pilots and technical-support personnel are selected at random because we want the operating environment and conditions to be typical instead of ideal. The test squadron flies exactly one year.

Then my fun begins, for I am the chief product analyst. Let me tell you, we cut that test data ninety-nine different ways, and when we think we have all the answers, we come up with a hundred other questions. From this analysis we can fairly accurately forecast what it is going to cost us to produce and operate these aircraft. This forecast remains a top secret until the Big Day.

On the Big Day, the generals arrive in full regalia. The red carpet - actually, it's a welcome mat - is rolled out for me. One can hear a pin drop when it's time for me to announce how many planes can in fact be produced. You see, the number of planes to be produced depends as

much on my analysis of projected operating and support costs as it does on the initial per-unit acquisition cost. And since our generals' future promotions ride on their ability to produce the desired number of planes within the anticipated budget, I always have their undivided attention.

Following the announcement, we turn our attention to the suggested design improvements. The good suggestions are adopted and modifications are made to the design. Within weeks, the production line rolls.

As the aircraft enter the active inventory, my favorite task begins. Detailed data from the field and depot flows into my office where it is fed into a computer. (Yes, we have them, too.) Our data are quite accurate. One reason for this is that we check for obvious errors and we track down the field technician who is the culprit. Believe me, he won't get the chance to do it again.

These data are analyzed in the hope of pinpointing areas or components that lend themselves to reliability improvement. We are particularly interested in areas in which slovar investment will pay high dividends in terms of greater reliability and lower support costs. We are also extremely concerned about the availability of spare and repair parts. As I mentioned before, the consequences of having an expensive and sophisticated aircraft grounded for lack of a valve or spark plug make me shiver.

Let me add that careful attention is paid to test equipment and test criteria. They must be efficient and realistic. They must purge—I mean isolate—the fault.

On the C-3, we found that the design modifications we made actually reduced projected annual operating and support costs by almost 120 million slovars. The generals were ecstatic. It's the kind of thing that helps one forget some of the less-than-joyous Big Days. More importantly, we were able to divert the excess defense funds into a training program in microelectronics communications for our chess team, which is good for the overall morale of the country.

At any rate, that's how we Upper Slabovians get the most sting for the slovar. If you ever get over this way, feel free to stop by and say hello. When you cross the border, just ask around. Everyone knows me. But please, whatever you do, don't mention this article. As I said before, around here it makes sense to keep a low profile.

**DMJ**

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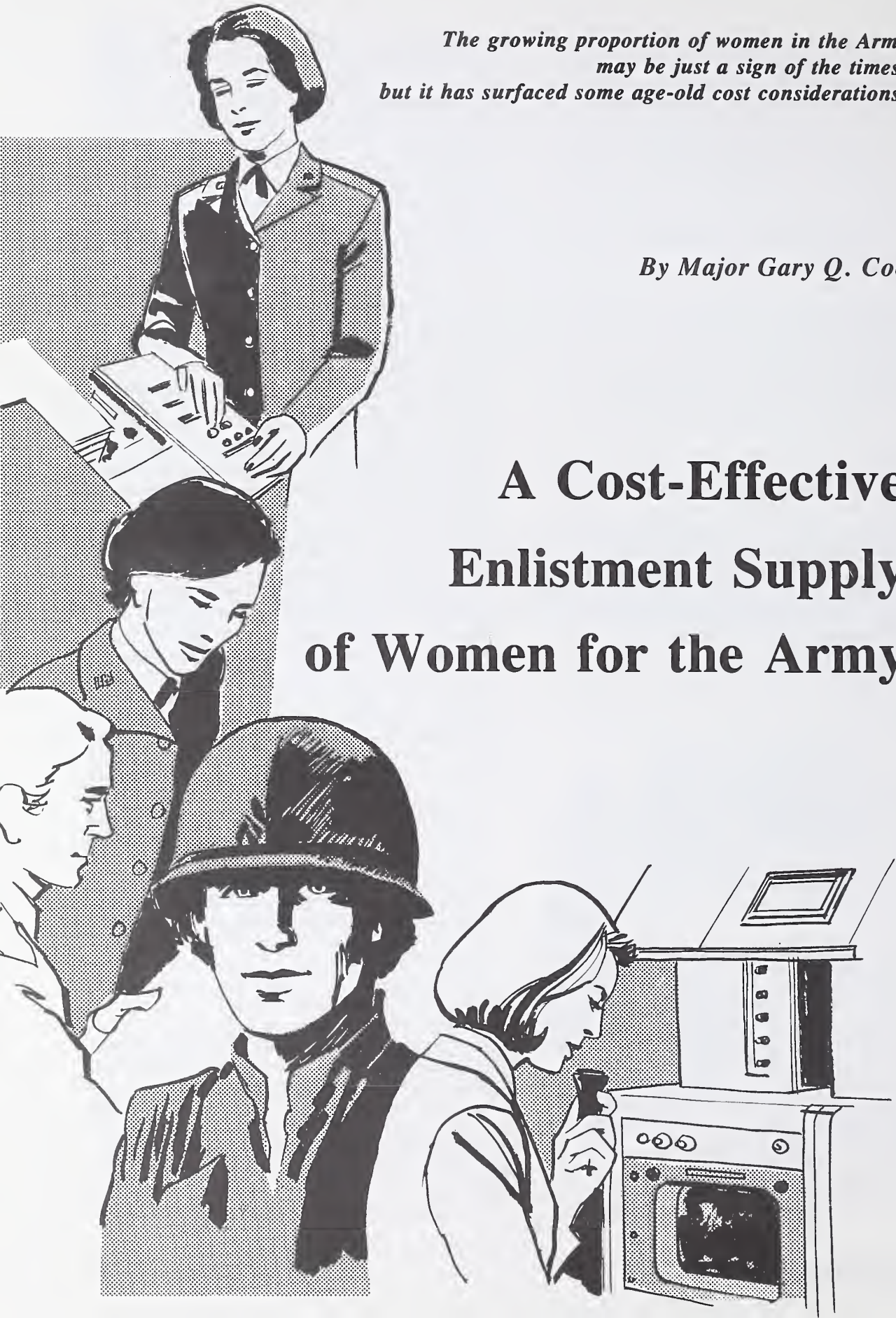
*RUSSELL M. GENET is an operations research analyst in the Acquisition Logistics Division of the Air Force Logistics Command, Wright-Patterson Air Force Base, Ohio. As such, he ensures that logistics-support considerations are reflected in weapon-systems design. Mr. Genet received a bachelor's degree in electrical engineering from the University of Oklahoma in 1964.*

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*The growing proportion of women in the Army  
may be just a sign of the times,  
but it has surfaced some age-old cost considerations.*

*By Major Gary Q. Coe*

## A Cost-Effective Enlistment Supply of Women for the Army





As a result of the decision to discontinue conscription at the end of fiscal year 1973, the military now has to compete with the college classroom and industry for qualified individuals. With a projected 25-percent decline in the 18- and 19-year-old male manpower pool for the 1980s, the competition for qualified young men stands to increase.<sup>1</sup>

Since the late 1960s, perceptions of the proper role of women in American society have changed considerably, and in 1972 the Department of Defense announced that it was expanding the number as well as the roles of women in the military. At that time, there were roughly 12,500 enlisted women in the Army, representing only 1.8 percent of total Army strength. But by the end of 1978, there were roughly 50,000 enlisted women in the Army, representing 6.6 percent of the force. Furthermore, DoD has issued guidelines to the Army for increasing the number of enlisted females by FY 83 to 80,000, more than 10 percent of the projected Army end strength for that year.<sup>2</sup>

Expanding the role of women in the armed forces is no simple task. There are social and national security issues to be examined, and these issues lend themselves to an array of both pragmatic and emotional arguments. A recent Brookings Institution study dealing with many of these issues, particularly female recruiting, concluded that it is difficult to predict the number of women who would be interested in enlisting. Nevertheless, the study leaves one with the impression that many qualified women would be attracted to military service. The study indicated that about four hundred and twenty thousand 18- and 19-year-old women could be expected to score above the thirtieth percentile on mental tests and meet current educational and physical standards. (Ed. note: Army criteria for mental tests is fiftieth percentile, not

the thirtieth percentile used by Brookings.)

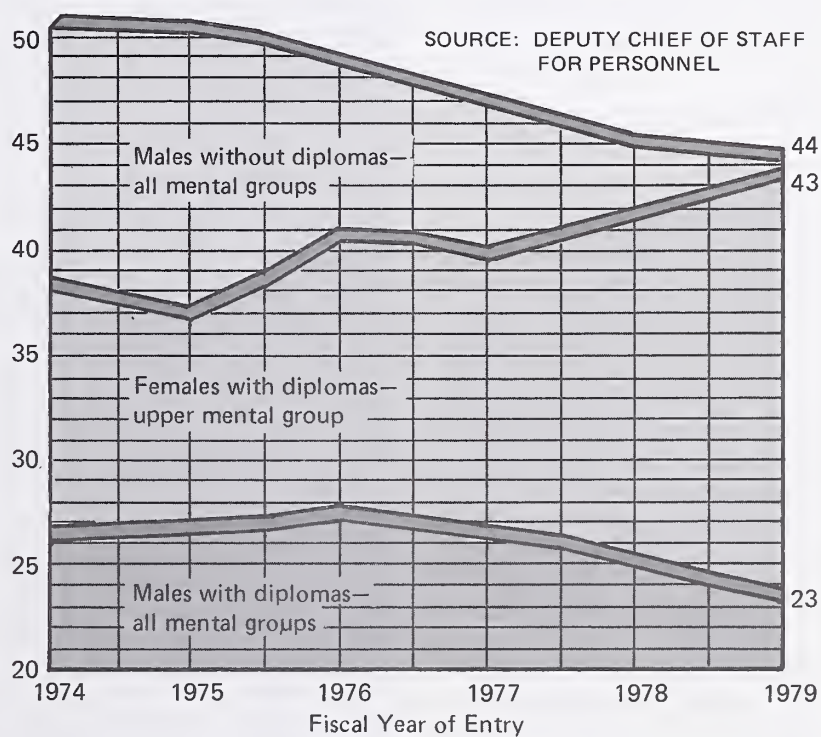
## Cost of Attrition

Recruiting costs can be divided into two categories. The first is the annual recruiting budget as appropriated by Congress. This is provided to the Army to attract, enlist, and process personnel into the active-duty force. The other area is the lost-opportunity cost which results from recruiting individuals who do not complete a full term of service. This cost results in increased dollar outlays for additional recruiting, training, support, and administration.

Analysis has shown that attrition, defined as separation from the military prior to the scheduled expiration term of service, is a major contributor to recruiting costs. It has also been shown that recruitment of the high-school

diploma graduate is essential in reducing attrition. The 36-month attrition rate for males entering the service in FY 74 was 39.1 percent, a rather high figure. However, through management action, this male attrition rate is declining and is expected to drop to about 30 percent for those males who entered the Army in FY 78. The 36-month attrition rate for females entering the service in FY 74 was 40.6 percent. The attrition rate for female diploma graduates is expected to increase from 38.0 percent of FY 74 accessions to 43.1 percent in FY 78 (see Figure 1). The principal reason for the increase in female attrition is the recent Congressionally mandated cessation of most abortions. Additionally, physical disqualification rates have increased. The reason the female attrition rate has not increased more is because the Army initiated a policy in FY 78 precluding the enlistment of nongraduate women.

**Figure 1. Historical and Projected Patterns of Male and Female Attrition, 1974-1979**



<sup>1</sup>David Grissmer and Kwan Kim, "DoD and Navy Manpower Supply Scenarios Through 2000," MATHTECH, Inc., 1977.

<sup>2</sup>Consolidated Guidance FY 1980-1984, Office of the Secretary of Defense, March 1978.

## Cost-Effective Predictors

In FY 77, a study was conducted to determine predictors of cost-effective recruiting.<sup>3</sup> Such predictors would allow recruiters to identify individuals who were less likely to attrite. A computer query of the Army enlisted-personnel master file was used to trace monthly gain cohorts from FY 74 through FY 77 to their attrition dates or the expiration of their terms of service. (A gain cohort is defined as a population which enters the Army at a particular time.) The most significant finding was that the higher the educational level of a recruit, the smaller the likelihood that he would attrite. This was particularly true of diploma graduates, who as a group showed about half the probability of the nongraduates of not completing a full 36-month tour of duty.

It was also concluded that within educational levels, the higher the mental group category, the smaller the likelihood the recruit would attrite. Similarly, age was found to be a factor. Nongraduates who were under 18 years or over 22 years of age were shown to attrite from the Army at a higher rate than individuals in the 18- to 22-year-old range. Finally, gender was determined to be significant. Female soldiers were shown to attrite at a rate 10 to 15 percent higher in a 36-month period than that of males of the same educational level and mental category.

Most of the analytical work for the Army's FY 78 and FY 79 Accession Structure Plan was directed at identifying high-attrition risk categories in the nongraduate male market. Although the focus of the analysis was on male recruiting, many interesting facts also surfaced with respect to the female recruiting market.

Prior to FY 78, approximately 10 percent of all the new female enlistees were nongraduates with a general-

education certificate. This category of accession produced the highest 36-month attrition risk, nearly 59 percent. Consequently, in FY 78 the Army decided to recruit only diploma-graduate females who had attained a score of 59 or higher on the Armed Forces Women's Selection Test. The AFWST is similar to the Armed Forces Qualification Test given to males except for the space-perception subtest, which is not included. Because the AFWST differs from the AFQT by virtue of this one subtest, it would appear that the definition of mental-group category for males and females is slightly different. However, it should be noted the scores from both tests are converted to percentiles; consequently, any difference should be nominal for our discussion.

Because of the many unknowns and variables associated with increasing the female strength of the Army, there are numerous traps and arguments one

can encounter in developing a rationale as to the cost-effectiveness of recruiting more women. For example, the Brookings study cited over 200,000 white-collar Army jobs in which women could be as effective as men.<sup>4</sup> One can, for instance, easily visualize a woman operating a switchboard with a communications unit. However, the layman often does not realize that a switchboard operator in a communications unit must also dig latrines and move heavy equipment. Thus, it may be sophisticated to compare military white-collar jobs with similar civilian jobs, because there is more to the military job than meets the eye.

## Tradition vs. Need

The Army has decided that it will enlist women into the skill areas that it needs filled instead of overstocking the traditional female skill areas. This

**Women are now making their mark in a number of Army skill areas that until recently were open to men only. Among the more popular of the nontraditional specialties are the aviation-related occupations of avionics maintenance specialist and aviator.**

U.S. Army photographs



<sup>3</sup>Major Neil Smart, "Active Army Accession Cohort Attrition Study: FY 74-77," Office of the Deputy Chief of Staff for Personnel, Headquarters, Department of the Army, 1972.

<sup>4</sup>Martin Binkin and Shirley Bach, "Women and the Military," The Brookings Institute, Washington, DC, 1977.





decision was fundamental to the management of the female recruiting problem and is a corollary to the premise that the Army can achieve a higher-quality accession with women recruits for a given skill.<sup>5</sup> The combat-exclusion policy, as it has been called, was implemented in 1977 and allows enlisted women to serve in military occupational skills at any organizational level except battalion-size and smaller units of infantry, armor, field artillery, combat engineering, and low-level air defense. Women may, however, be assigned to brigade-level headquarters, Hawk and Hercules air-defense units, and field-artillery elements for certain missiles and rockets.

In 1978, the Army Chief of Staff sent to all units special guidance on the use of women soldiers in combat. He announced, "Women are an essential part of the force; they will deploy with their units and in the skills in which they have been trained."<sup>6</sup>

In light of these decisions made on the recruitment and assignment of women soldiers, plus the commitment to meet the challenges created by their influx, the major concern clearly becomes whether there is an adequate supply of high-quality women to meet annual accession requirements.

Statistical analysis reveals that it may be as cost-effective to recruit a male nongraduate from a higher mental category as it is to recruit a female graduate from a lower mental category. And all else being equal, the male recruit generally offers greater physical capabilities and can be assigned to combat positions.

But in discussing the cost-effectiveness of the trade-off between male and female recruits, one must consider the possibility that no such trade-off exists. While the move to recruit more women with diplomas is based partially on the premise that they can be utilized in lieu of nongraduate males, preliminary analysis suggests that this premise may

<sup>5</sup>"Problems in Meeting Military Manpower Needs in the All-Volunteer Force," DoD Comptroller General's Report to the Congress, May 1973.

<sup>6</sup>Chief of Staff message to the field, "Women in the Army," Headquarters, Department of the Army, March 1978.

not be entirely realistic. Both males and females with diplomas tend to compete for enlistment into the same attractive skill areas that have counterparts in the civilian labor market. These areas generally have few openings, although three career-management fields which are particularly attractive—administration, medicine, and law enforcement—have relatively large populations.

Furthermore, a significant portion of male nongraduates is enlisted into combat-arms skills not available to women, thus precluding a male-female trade-off in these areas. Finally, it has been demonstrated through the first five years of the volunteer Army that the successful recruitment of diploma graduates correlates with total annual recruiting requirements; in other words, the smaller the recruiting requirement, the smaller the number of diploma graduates that can be expected to be recruited.

The corollary to this reasoning is that increased accessions of women with diplomas will result in decreased accessions of males with diplomas, if the recruiting requirement is constant. However, more study is required before conclusive results can be announced. Still, if increasing diploma-graduate females among accessions causes decreases in diploma-graduate male accessions, the result will not be cost-effective.

### “How Many Women?”

The cost-effective attainment of the DoD-directed FY 83 Army female end strength lies in the recruitment of female diploma graduates in the upper mental-group categories. The critical question thus becomes: “How many women are there in this category?”

The primitive approach to answering this question would be to multiply the total number of 17- to 21-year-old females who are qualified and available for military service by the percentage of those who are diploma graduates. One would then multiply this product by some esoteric factor determined by contracted economists to account for the competition from industry, other military services, and higher education. Also to be considered are the propensity

of women to join the Army, the propensity of women to work, the unemployment rate for women, and wage-scale differentials between the military and private sectors. This crude approach was used by the services when they initially investigated the recruiting market at the outset of the all-volunteer-force policy. It was an acceptable approach to examining the problem at that time, but it is outmoded today.

Certainly, a number of independent variables impact on the recruitment of male diploma graduates and on the recruiting environment. These include unemployment rates, budgeted recruiting dollars, and the total recruiting goal each year. Using techniques of regression theory, it was determined that of all the variables examined, unemployment of 18- and 19-year-old males correlated with the highest

degree of sensitivity to male-graduate accessions. One can thus conclude that male diploma graduates are supply-limited in the range of 74,000 to 92,000 with an expected annual production rate of 86,000 when the unemployment rate for 18- and 19-year-old males is 15 percent. Moreover, any variance from the expected annual accession rate of male diploma graduates will be extremely sensitive to such an unemployment rate and somewhat sensitive to the total annual requirement for male recruits. Finally, as the population of young Americans declines over the next decade, so will the supply of male graduates.

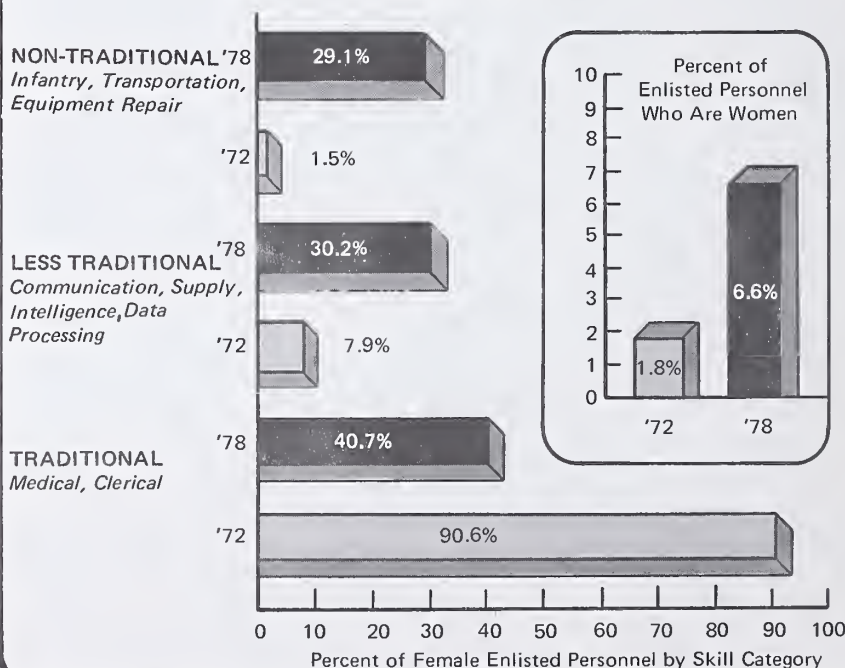
### Women’s Propensity to Work

The development above provides an excellent starting point to produce a

**Figure 2. Women’s Shifting Attitudes About Traditional Skills**

*In FY 1978 the Army concentrated on enlisting women into the underpopulated, non-traditional skill areas. Later analysis indicates, however, that women are moving back to traditional skills after they enlist.*

SOURCE: DEPUTY CHIEF OF STAFF  
FOR PERSONNEL





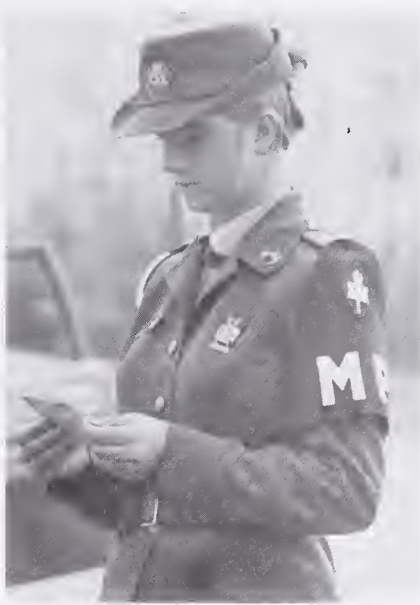
supply model for the enlistment of females. By assuming that the enlistment supplies of female diploma graduates and male diploma graduates are in direct proportion to the percentages of women and men in the work force, one can arrive at a relatively unconstrained estimate of female diploma graduates.

At the end of calendar year 1977, women comprised 41 percent of the labor force. This percentage reflects a substantial propensity of women to work. More importantly, because this percentage is based on a sample of women of all ages, it can be regarded as a conservative indicator of the propensity of 18- and 19-year-old women to work. Proportionally applying 41 percent as a constraint on the total supply of 86,000 female graduates, one can estimate the labor constraint supply to be about 59,800 women.

There appears to be a general reluctance on the part of women to enlist in nontraditional skills (see Figure 2). In FY 78, women were excluded from approximately a third of all of the available initial-entry training spaces. These spaces were in combat arms or areas in which the annual enlisted needs had been satisfied. This means that if 100 women were considering enlistment into the Army and 30 of them wanted only combat arms, then only 70 would enlist. On the other hand, if all 100 wished to enlist into skills other than the combat arms, the competition for the limited number of vacancies in attractive skills might preclude matching job preferences with job vacancies. Regarding the number of females who, out of the original 100, would not join because they were unable to enlist into the skill area of their choice, one might make an educated guess of 30 to 40. This guess is based on observed rates at which women enlist into various skills. Applying the optimistic 70-percent factor derived from this reasoning further reduces the estimate of the female enlistment supply to 42,000.

### *Availability of Women*

Of the male diploma graduates who enlisted in FY 77, 46.7 percent were in the upper mental categories. It is reasonable to assume that a comparable



**After initial entry into nontraditional skill areas, women have shown a tendency to migrate to more traditional specialties such as administration and law enforcement.**

percentage of the same upper mental categories would be found in the enlisting female population if the Army attempted to recruit all available female diploma graduates. Thus, the final estimate for female diploma graduates from the upper mental categories who could be expected to enlist becomes 46.7 percent of 42,000 women, or about 19,600 women.

The above analysis is a piecemeal construction of a supply estimate based upon an examination of economic factors thought to have the greatest impact on enlistment supply. There are ways to check the results of this estimate. It is unlikely that all the FY 77 recruitable women graduates in qualifying mental categories were in fact recruited that year. However, it seems entirely likely that those in the top two mental categories, MG I and MG II, were recruited. This number was 9,868. By assuming the male-female ratio (.848) of those in the third highest mental category, MG IIIa, to those in MG I and MG II is the same as it was in FY 77, we can estimate the enlistment supply of female diploma graduates from Mental Group IIIa to be 8,365 (.848 times 9,868); the estimate of the

total supply of females from the upper mental categories then becomes 18,233 (9,868 + 8,365).

Another approach to validating the above analysis is to consider the FY 78 female recruiting experience. By May 1978, the United States Army Recruiting Command was having difficulty achieving its female recruiting objectives, falling behind by an accumulated 1,500 people at one point. Analysis of female recruiting production rates indicated that USAREC would recruit no more than about 16,500 females if recruiting trends continued. To alleviate this recruiting problem, in June 1978 the Secretary of the Army decided to lower the enlistment standards for women, allowing those who scored above 50 on the Armed Forces Women's Selection Test to enlist. This action immediately improved recruiting production of women and enabled USAREC to achieve its female recruiting mission of 99.5 percent of 17,600; it was also estimated that this action would lead to the enlistment of about 3,500 more females if a proportional number of skill areas were made available. All three analyses seemingly indicate that approximately 20,000 females can be recruited cost-effectively in a given fiscal year, depending on the recruiting environment.

### *How Large a Supply?*

The 20,000-female figure presented above was arrived at using FY 77 recruiting data. In this regard, three factors are very significant:

- The unemployment rate of 18- and 19-year-old women.
- The declining manpower supply for the next decade.
- The total accession requirement.

In FY 77, the unemployment rate of 18- and 19-year-old women was 16.8 percent. Statistical analysis indicates that for each percent of change in the unemployment rate of 18- and 19-year-old females, there is a corresponding increase of 400 to 500 females available for recruiting. The 25-percent decline in the projected manpower pool of young males also applies to females over the next decade. Consequently, it is projected that the estimate of 20,000 available females will decline to 15,000

by the late 1980s. Finally, the total accession requirement is significant in that as the requirement increases, so does the proportionate number of attractive skills for women.

The estimate of 20,000 cost-effective females available for Army enlistment differs from the Brookings claim that high-quality females are demand-limited and thereby offer a reasonable alternative to the recruiting problem caused by a declining manpower pool through 1990. Because it will take more than 20,000 female accessions a year through FY 83 to reach the 80,000 level sought by the Defense Department, the directed FY 83 Army female enlisted end strength will not be attained in a cost-effective way. In addition, with the declining pool of females and a possible improvement in female unemployment, the likelihood of achieving this FY 83 female end strength is further diminished.

### *Increasing the Supply of Females*

To increase the enlistment supply of females, the Army can always lower mental standards. However, if the Army chooses this option, it appears likely that recruitment will be even less cost-effective. The projected attrition rate of female diploma graduates being recruited into the Army is rapidly approaching that of current non-graduate male accessions. Further lowering mental standards would certainly cause the female attrition rate to exceed that of the nongraduate males.

A longer climbpath to the DoD-directed female end strength can be chosen. By directing the Army to achieve the 80,000 female enlisted end strength by 1990 rather than 1983, fewer female accessions would be required each year. Admittedly, this course of action offers no guarantee that the 80,000 goal could be achieved cost-effectively. The increased attrition rate and the declining pool of women

would cause uncertainty in the outyears if this course were chosen.

The Department of Defense could reduce the Army's targeted FY 83 female end strength to one more attainable within the constraint of the female enlistment supply. If the military is truly recruiting women to offset a declining pool of males in the 1980s, then a reexamination of the situation might be fruitful. According to a recent study, the population of 18- to 21-year-old males was 5.75 million in 1965.<sup>7</sup> By 1974, this had increased to 8 million, and the Army brought in 166,800 new males, or about 2.09 percent of the pool. By 1979, this population had increased even further to 8.7 million, and the initial FY 79 requirement for males was 128,100, or about 1.47 percent of the pool. But, by 1984, according to the study, the manpower pool will decline to about 8.25 million, and male-accession requirements have been pegged at 1.46 percent of that pool.<sup>8</sup>

The key point to be made here is that the Army is already managing the problem of a declining manpower pool effectively. A number of actions taken by Congress, the Department of Defense, and the Army have permitted reduced male-accession requirements in the outyears. More women have been programmed into the Army, and attrition has been reduced significantly. Reductions in the Army end strength have been made without great changes to the force structure. More efficient management of Army strength has caused reduced waste in Army manpower.

One final point needs to be made: even though the manpower pool is declining over the next few years, it will still remain higher than it was over a decade ago. **DMJ**

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<sup>7</sup>Richard Cooper, "Military Manpower and the All Volunteer Force," *The Rand Corporation*, 1977.

<sup>8</sup>The Army Program Objective Memorandum FY 1980-1984, Headquarters, Department of the Army (undated).



### New Officer Evaluation Compares Rating Trends

A new Army officer-evaluation system is scheduled to take effect in October 1979. According to Army Chief of Staff Gen. Bernard W. Rogers, it promises greater potential for credibility than the current system.

The new system will emphasize increased communication, development of subordinates, and the setting of objectives. In the interest of fairness, all officers will get a final report under the current system before introduction of the new one.

Under the new procedure, an officer will have an opportunity to describe his duties, responsibilities, and objectives at the beginning of each rating period. At the end of the period, he will get a chance to comment on how well he believes he has achieved his objectives.

While the current system has a rater, endorser, and reviewer, the new system will employ a rater, an optional intermediate rater, and a senior rater. The Army expects most officers to be rated by only the rater and the senior rater, the latter playing a significant role in evaluation.

The Army will also maintain a senior-rater profile which will provide boards and managers with the rating history of each senior rater and will permit comparison of a specific rating to

the reviewer's normal rating tendencies.

### Army Leads Government in Minority Contracts

Citing President Carter's mandate to all Federal agencies to promote the development of minority business enterprise, Army Secretary Clifford L. Alexander, Jr., said the Army awarded over \$150 million to minority firms in fiscal year 1977, leading all other Federal agencies in this effort.

In an October 1978 address to the Atlanta Minority Business Opportunity Committee, Secretary Alexander stated that the Army's goal for minority contract awards in fiscal year 1978 was \$172 million, \$22 million

more than the previous year's total. He told the organization, however, that in spite of significant strides by individuals and some minority business groups, the overall achievements have been marginal in relation to the potential. He added that corporate America has generally not been responsive to the concerns of minorities, and that this reluctance to accept minority business people into the corporate community has hindered minority capitalism.

### NCOs Tested for Recruiting Duty

To compensate for a decline in the number of qualified non-commissioned officers volunteering for recruiting duty, the Army is selecting 250 top-notch E-6s for three-year, nonvoluntary assignments as recruiters. The Army describes the action as a test, and it plans to observe the new recruiters closely for their effectiveness and suitability before reclassifying them. Army officials feel that E-6s are ideally suited for recruiting duty because of their military experience, professionalism, and maturity. Of the NCOs selected, 40 percent will come from combat support branches, 35 percent from combat service support branches, and 25 percent from combat arms branches.

Because the Army needs an estimated 1,700 new recruiters, it is still seeking volunteers.



Army Secretary Clifford L. Alexander, Jr.

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## **Record Recruitment of High School Graduates**

A record high of more than 90,000 high school graduates joined the Army in fiscal year 1978. Seventy percent of the 106,500 new male recruits had high school diplomas. This represents a 14-percent increase from the previous fiscal year. Additionally, more than 17,500 women, all required to have high school diplomas for entry, joined the Army in fiscal year 1978, and more than 10,000 women reenlisted, exceeding the reenlistment goal for women by 4 percent.

In fiscal year 1978, the fifth year of Army recruiting following the suspension of the draft, the Army was less than 2 percent shy of its recruiting goal.

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## **Hanscom AFB Encourages Minority and Small Business**

Since fiscal year 1977, the Electronics Systems Division of the Air Force Systems Command at Hanscom Air Force Base, Maine, has been repeatedly commended for the success of its small business and minority contracts

programs. The division has received the Air Force Small Business and Minority Enterprise Program Award from the Secretary of the Air Force and has won the first Minority Business Award granted by the Boston Federal Executive Board, an organization representing all Federal agencies in New England and northern New York. The awards recognize the division's excellence in helping minority-owned firms enter the mainstream of United States business.

Primarily through industrial contracts, the Electronics Systems Division manages the Air Force's development and production of communications, command, and control equipment. Whenever possible, it has attempted to award small or minority businesses major contracts and subcontracts. The division awarded \$2,693,596 in fiscal year 1977 and \$3,865,988 in fiscal year 1978 to minority businesses.

In its 1978 award, the Boston Federal Executive Board noted that the division granted a major technical-support contract of more than a million dollars to a minority-owned computer programming firm, setting a precedent followed by other Air Force organizations.

The Electronics Systems Division won the 1978 Secretary of the Air Force Small Business and Minority Enterprise Program Award for exceeding the \$600,000 goal set by the Air Force Systems Command for fiscal year 1977 by

nearly \$2,100,000. Furthermore, the division exceeded the combined minority-contract goal of \$500,000 through the efforts of the MITRE Corporation and the Massachusetts Institute of Technology Lincoln Laboratory, two Federal contract research centers which it funds. During the same fiscal year, the division surpassed the small-business contract award goal of \$21,000,000 by channeling \$27,202,000 to small firms.

In 1975, the Electronics Systems Division began efforts to increase minority business participation through exchanges with the Black Corporation Presidents of New England. Division officials toured regional minority-owned firms to assess their capabilities, and minority business leaders, in turn, familiarized themselves with the facilities and contract requirements at Hanscom. In the following year, the division added a clause to all systems-acquisition solicitations stipulating that large contractors commit themselves in their proposals to awarding subcontracts to minority-owned firms whenever possible. The Air Force Systems Command then adopted this clause for use throughout the command, and other Air Force activities and Federal agencies have followed suit.

Another program helped minorities to obtain subcontracts by giving them an opportunity to demonstrate their



capabilities at numerous plants of major contractors. This led to an increase in minority subcontracts throughout the entire Air Force.

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### **Top Air Force EEO Manager**

Lt. Gen. George H. Sylvester, Commander of the Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio, has won the Air Force's 1978 Equal Employment Opportunity Award for Management. During the year General Sylvester initiated and revitalized numerous EEO programs benefiting the members of his command and the surrounding community.

Under his direction, the command restructured the EEO Advisory Committee to allow for spontaneous dialogue with top management, initiated programs aiding women and minorities, and added new staff members to monitor EEO programs. The general undertook to personally review all civilian placement actions for positions at the GS-14 and GS-15 levels. He also initiated a new upward-mobility program, designed to give personnel locked in dead-end jobs a chance to learn aircraft maintenance, sheet-metal work, and avionics repair.

Programs impacting on the

adjacent community include an open-door policy with the Greene County chapter of the National Association for the Advancement of Colored People, a cultural and information exchange, and career-motivation tours for minority students from Dayton high schools.

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### **Logistics Manager Wins Top Civilian Honor**

Max E. Wallace, a supervisory logistics management specialist at the Air Force Systems Command, Wright-Patterson Air Force Base, Ohio, won the Air Force Meritorious Civilian Service Award, the highest civilian honor bestowed by major Air Force commands. Mr. Wallace was cited for his supervision, within the Acquisition Management System Program Office, of the design, development, testing, and implementation of an automated contract information storage-and-retrieval system.

In this system, the computer data base and the hard copy of any contract document, supplement, or any status change are identical, allowing contract information retrieval within a day's time. Since its implementation in March 1976, the system has handled daily about \$30 million in contract payments, saving the Air Force roughly \$535,000 a year.

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## **Army Updates Guidance on Affirmative Action**

Calling it the most important management tool by which to ensure that women and minorities are accorded genuine opportunities for advancement and professional fulfillment, Army Secretary Clifford L. Alexander, Jr., unveiled the Army's new affirmative-action plan. Enhancing the combat readiness of our forces was cited as the fundamental purpose of the plan.

This plan marks the second attempt since the affirmative-action policy was introduced in 1972 to reinforce Defense Department equal-opportunity directives by revising Army regulations. It also introduces some procedural changes for reaching desired goals.

The major military commands will now become more involved and take on greater responsibility for developing, reaching, and reviewing affirmative-action goals. For example, they will be required to collect more detailed information on minorities by identifying their personnel as members of one of 15 specific ethnic groups. Currently, personnel are identified as white, black, Hispanic, Asian, or Native American. Such data will allow the Army to measure its progress more accurately.

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## Commercial Energy Award Lauds Navy Management

A dramatic 48.6 percent reduction in natural gas consumption has earned the Naval Weapons Station, Seal Beach, California, a Southern California Gas Co. Commercial Concern award for sound energy management. This reduction amounted to more than 248 million cubic feet of gas and a savings of around \$496,000.

To achieve such energy saving, command management continuously monitored energy consumption; awarded contracts for energy-conservation surveys, concentrating on heating, air conditioning, and venting; and conducted week-long energy-conservation classes for base personnel. The station also began boiler tune-up and efficiency programs and modernized utility systems throughout the base.

Thermostats were closely regulated for winter heating and summer air conditioning. Timing devices were installed to automatically shut down boilers and air conditioning systems when facilities were unoccupied, and the entire gas distribution system was surveyed for possible leaks. In addition, command management had small, domestic hot-

water heaters installed for summer use so that the central boiler plant could be shut down.

The station was able to realize this large energy saving despite an increase of 497,483 square feet of enclosed floor space and an 11-percent rise in the number of base personnel.

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## DoD Award Honors Conservation Programs

Fort Sill, Oklahoma, has received the Secretary of Defense Natural Resources Conservation Award for 1977. The award is presented annually to the military installation in the United States which has demonstrated the greatest progress toward achieving environmental and ecological objectives over a three-year period. The award program is designed to ensure maximal recreational use of an installation's property, consistent with the installation's official mission.

For individual contribution, the award went to Mr. William Frazier, a station forester at the Meridian Naval Air Station, Mississippi.

Camp Lejeune, North Carolina, winner of the award in 1975, was presented a special citation for the continuing excellence of its conservation program. Also honored were the Meridian

Naval Air Station in Mississippi and the Arnold Engineering Development Center in Tennessee.



Marine Corps Commandant Gen. Louis H. Wilson

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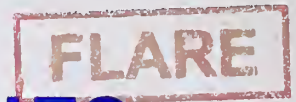
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## Marine Commandant Made Full Member of JCS

General Louis H. Wilson, Commandant of the Marine Corps, has been made a full member of the Joint Chiefs of Staff under a provision of the fiscal year 1979 Defense Appropriation Authorization bill. He is the first commandant to assume full membership in the JCS.



Event	Date	Place	Contact
Computers in Manufacturing	Jan. 29-31	New York, NY	AIIE Seminars P.O. Box 3727 Santa Monica, CA 90403 (213) 450-0500
Source Evaluation and Selection Process Seminar	Feb. 8-9 Mar. 12-13	St. Louis, MO Atlanta, GA	TMSA Seminars P.O. Box 91295 Los Angeles, CA 90009 (213) 670-2973
Risk Analysis 1979 (in government programs)	Feb. 22-23	Palo Alto, CA	(213) 670-2973
Proposal Preparation	Feb. 12-13	Los Angeles, CA	The American Graduate University and Procurement Associates, Inc. 733 North Dodsworth Avenue Covina, CA 91724 (213) 331-5484 or (213) 966-6814
Interviewing for Results	Feb. 21-23	Washington, DC	Special Programs Graduate School, USDA 277 National Press Building 529 14th Street, N.W. Washington, DC 20045 (202) 447-7945
Management Control Systems— Their Design and Use	Apr. 9-13	Washington, DC	(202) 447-7945
Assessment Centers for Executives, Middle Management and First-line Supervisors	Call contact	Washington, DC	(202) 447-7945
Management Skills for Engineers and Scientists	Mar. 12-14	Washington, DC	Director Continuing Engineering Education George Washington University Washington, DC 20052 (202) 676-6106 or (800) 424-9773
Security Course	Mar. 12-16	Los Angeles, CA	American Society for Industrial Security 2000 K Street, N.W. Suite 651 Washington, DC 20006 (202) 331-7887
The DoD FY 80 RDT&E Budget in Perspective	Apr. 3-5	Washington, DC	Electronic Industries Association 2001 Eye Street, N.W. Washington, DC 20006 (202) 457-4900
Improving Managerial Skills of the New or Prospective Manager	Call contact	Call contact	American Management Associations 135 W. 50th Street New York, NY 10020 (212) 586-8100



# IN UPCOMING ISSUES

- The importance and potential benefits of preretirement counseling.
- How the Defense Medical Materiel Board manages the DoD medical-supply inventory.
- Ways to improve the Air Force officer-evaluation system.
- Why DoD should adopt a new accounting system that regards personnel expenditures as capital investments.
- How the DoD Product Engineering Services Office reviews production readiness for all major weapons systems.
- The need to develop an improved DoD data base for making procurement decisions.
- Applying the criteria of cost/schedule control in measuring the performance of major weapons-systems contractors.